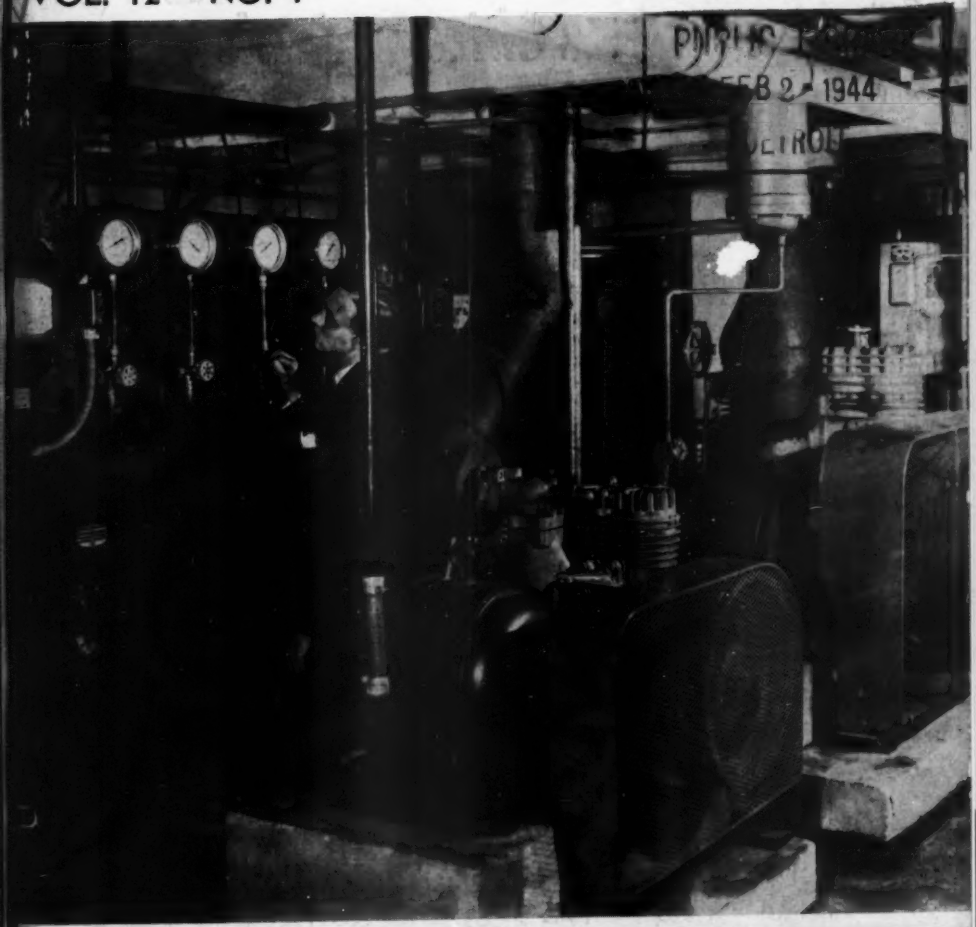
# Refrigeration Service Engineer

VOL. 12 NO. 1 ★ ★ ★ JANUARY . 1944



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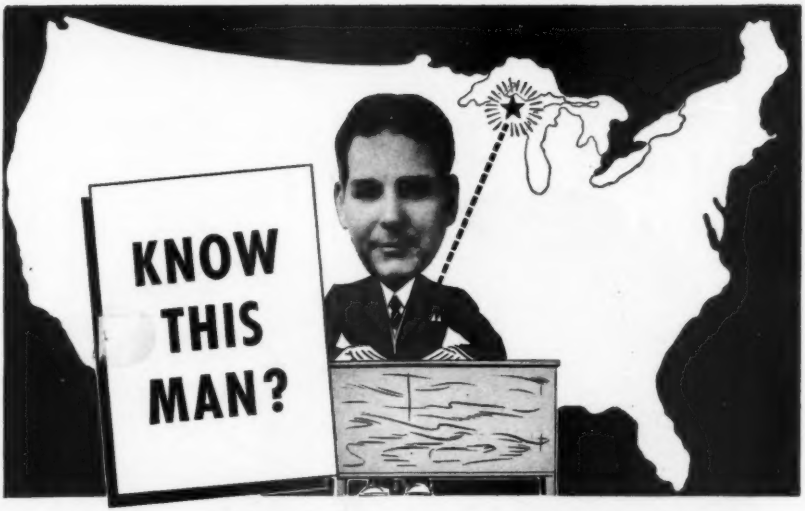


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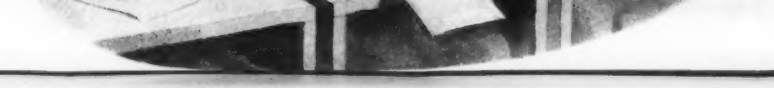

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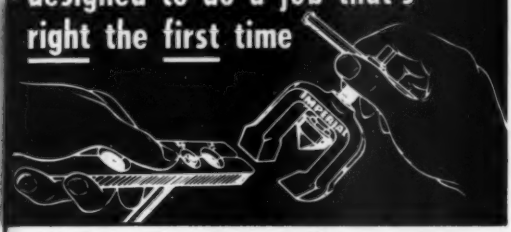

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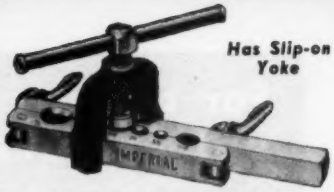


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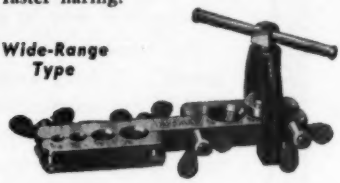
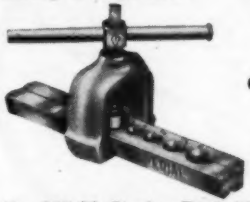


**No. 175-F Flaring Tool.** This tool handles a wider range of sizes than the No. 195-F described above. Flares 5/16", ¼", 3/8", ½", 5/8", and ¾" O.D. tubing. Has swivel type cone for easy flaring of large sizes.



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THOMAS COYLE
Manager, Chlorine Products Division

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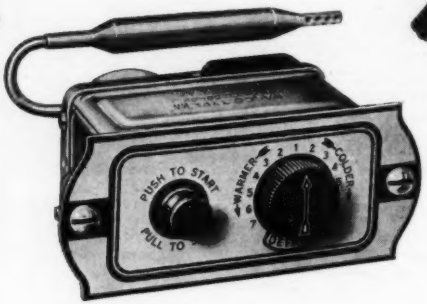


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**COLUMBUS, OHIO**

# The Refrigeration Service Engineer

Vol. 12 No. 1

January, 1944

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Official Organ
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## The Cover

Low temperature cabinet in Eastern University laboratory requires this extensive refrigerating equipment. Story on page 46.

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The Refrigeration Service Engineer

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# Pipe and Tube Bending

**NOTE: A handbook on Pipe and Tube Bending, issued by the Copper and Brass Research Association, provides information on practical methods for bending pipes and tubes of copper, brass and related alloys. The accompanying article is taken from a section of the handbook, complete copies of which are available upon request from the Copper and Brass Research Association, 420 Lexington Ave., New York 17, N. Y.**

## Support of Pipe Wall

IN bending a pipe or tube, the outer part of the bend is stretched and the inner part compressed, by most methods, and as the result of opposite and unequal stresses, the pipe or tube tends to flatten or collapse. To prevent such distortion, the common practice is to support the wall of the pipe or tube in some manner during the bending operation. The support may be in the form of a filling material or temporary support that is placed inside the pipe, or it may be external only and consist of using a bending device provided with curved or concave forms or rolls that prevent collapse in making the bend.

## Factors Influencing Bending Method

Copper and most of its alloys in tube form are capable of being formed into single bends of relatively small radius, as well as larger units embodying several bends in a single length of pipe. The bending operations are readily performed when the proper tools and technique are applied, the method depending largely on wall thickness, diameter and radius. Certain limitations are imposed by: (1) ductility of the metal which is stretched to form the outside of the bend; (2) tendency of the ouside surface of the bend to collapse or flatten; (3) tendency of the inside of the bend to buckle or wrinkle.

Copper and brass pipe and tubes are always annealed for bending, either empty or filled, as the percentage of elongation before fracture of cold-drawn copper is but 10 to 15 percent.

## Bending Qualities—Hot and Cold

Indication of the relative bending qualities of copper and copper-base alloys for both hot and cold bends is given in the table at the top of the next page.

## Temper

The effect of temper on bending qualities of tubes is so important that it may make the bending operations impossible even when

| Material | Cold | Hot | Suggested Temperatures for Hot Bending (Degrees Fahrenheit) |
|---|---|---|---|
| Copper | Excell't | Excell't | 1400 - 1600 |
| Silicon Bronze | Excell't | Very Good | 1300 - 1650 |
| Red Brass | Good | Good | 1550 - 1650 |
| High Brass | Good | Poor | 1400 - 1500* |
| Muntz Metal | Fair | Excell't | 1150 - 1400 |
| Copper-Nickel | Excell't | Fair | 1400 - 1600* |

* Hot bending difficult and not recommended but, if used, temperature should be as indicated.

other conditions are favorable. Optimum cold bending quality of all of the pure coppers, red brass, high brass, copper-nickel and silicon bronze is obtained with the following annealed tempers:

| Diameter | Grain Size Wall Thickness Over 0.035 In. | Grain Size Wall Thickness Under 0.035In. |
|---|---|---|
| Up to 1 in. | 0.050 mm. | 0.035 mm. |
| Over 1 in. | 0.070 mm. | 0.050 mm. |

The above annealed tempers are all nominal values from which a considerable variation can be tolerated and they should be considered simply as preferred tempers. Such tempers are generally used where the minimum bending radius is required, and where ease of fabrication is of great importance. However, where freedom from rough or orange peel surface is a factor, a smaller grain size with some sacrifice of bending qualities is indicated.

In certain applications larger radii are permissible and a greater stiffness in the finished product may be obtained by using a drawn temper tube. The preferred temper for bending in such cases is light drawn and would be acceptable for bends where the radius of the bending block is at least three times the outside diameter of the tube. For tightly wound coils as sometimes used in heat exchangers and where a very rigid coil is desired, a special temper is necessary. This can be either a light anneal or a very light draw and will usually have to be special to suit the individual requirements. Considerable gain in rigidity of thin walled tubes, such as J bends, traps, elbows, is made by annealing only that part of the tube to be bent, the remainder being hard temper. The temper of tube for hot bending is not important, since the tube will be annealed during the process and the original temper destroyed.

## Cold Bending

Cold bending is most commonly used because it has several advantages over hot bending, including ease of handling tubes, much higher rate of production, avoidance of necessity for acid-cleaning, and a more rigid finished product. The shape of the tubes is maintained in bending by drawing them over a mandrel of which several types are in common use. Any of the several common filler materials may be used instead of the mandrel to minimize flattening or collapsing of the bend. For any bends approaching the minimum radius, the use of a formed bending block and a formed shoe having contours corresponding closely to the circumference of the tube are necessarry in order to minimize distortion of the tube shape and to aid in preventing collapse.

| I | II | III | IV |
|---|---|---|---|
| | MINIMUM BENDING RADIUS (In Inches) | | |
| | Conforming Bending Block and Mandrel | | Cylindrical Bending Block |
| Actual Outside Diameter In Inches | (For D/g not Over 15)* Optimum Conditions | (For D/g not Over 50)* Commercial Work | (For D/g not Over 30)* Without Mandrel |
| ⅛ | 1/16 | ¼ | ½ |
| ¼ | ⅛ | 1/16 | 1 |
| ⅜ | 3/16 | ⅜ | 2 |
| ½ | ¼ | 5/16 | 3 |
| ⅝ | 5/16 | ½ | 4 |
| ¾ | 3/8 | 11/16 | 6 |
| ⅞ | ½ | ¾ | 8 |
| 1 | 5/8 | ⅞ | 10 |
| 1¼ | 11/16 | 1 1/16 | 15 |
| 1½ | ¾ | 1 5/16 | 20 |
| 1¾ | 13/16 | 1¼ | 27 |
| 2 | 1 1/16 | 1 3/8 | 35 |
| 2½ | 1 3/8 | 1 5/8 | — |
| 3 | 1 5/8 | 1 7/8 | — |
| 3½ | 1 7/8 | 2 1/8 | — |
| 4 | 2 1/8 | 2 3/8 | — |

* D/g expresses the ratio of tube diameter to wall thickness or gage.

The data in columns II and III of the above table are based on the use of high grade bending equipment employing grooved bending blocks, bending shoes and mandrels. For the minimum radii in Column II, extreme care must be used in the fit and adjustment. The bending blocks and shoes must fit the original tube very accurately, and the mandrel must be accurately adjusted longitudinally. For the minimum radii in Column III a good fit and good adjustment must be used, but as extreme care as for the conditions of Column II is not necessary. Here either a suitable sup-

porting mandrel or filler material can be used. For the minimum radii in Column IV, no filler material is contemplated, the bends being those that can be made with practically no mechanical assistance. For generally similar conditions but using a filler material, radii much sharper than in Column IV and approaching those in Column III can be used, but here the skill and experience of the operator are big factors.

The data in the foregoing table are based on copper and high brass tubes. There is relatively little difference in bending quality between copper and the brasses and it is considered unnecessary to separate the several alloys. It should be pointed out that slightly greater power would be required for bending silicon bronze and considerably more power for copper-nickel alloys. While the data in the foregoing table are based on 180° bends, little adjustment of radius is necessary for either 90° or 360° bends. In certain cases a slightly greater radius might be indicated for 360° and similarly a slightly shorter radius for 90° bends.

The Society of Automotive Engineers, Inc., in their Aeronautical Standard AS 130, covering the bending radius for tube for Aircraft Engines provides as follows for bending radius: "Bending radius shall be given to center line of tube; minimum bending radius, for general material, R = 2D; preferred minimum bending radius, R = 4D. A straight length is desirable between bends for clamping purpose but is not mandatory. Wrinkling of tube is not permissible."

Elsewhere in this book are given other criteria on bending radii dependent on certain conditions as stated.

## Hot Bending

No minimum radii are listed for hot bending, because almost any conceivable bend could be made hot providing sufficient peening were performed on the inside of the bend to prevent buckling, and the bending were performed slowly. The most suitable radius for commercial hot bending would, of course, be that listed in Column IV. All of the larger diameter tubes, principally heavy wall items, are commonly bent hot in order to reduce the necessary power input and to obviate the necessity for very special tools. In every case formed bending blocks and shoes, roughly corresponding to the contour of the tubes, should be used for hot work. It is customary to use either a sand filler or a steel mandrel in hot bending.

## USE OF FILLING MATERIALS

Various kinds of materials are used to fill pipe and tubes before bending, in order to prevent flattening at the bend. Those most commonly used are: dry sand, rosin, tar, lead, Woods Metal and salt. Each has its good points and each its limitations.

### Bending with Dry Sand Filler

Frequently pipes over one inch in diameter are bent in copper shops by first filling with dry sand. This permits bending of irregular radii, close offsets, multiple bends on different planes, and sharp radii.

The sand for filling pipes must be absolutely dry, as the pipes are usually bent hot. The moisture in undried sand will generate steam when the pipe is heated, which is liable to cause an explosion. Sand is dried for pipe filling on a red hot plate. Once dried, it can be used indefinitely.

Hard-drawn pipe is best for sand bending. A wood plug is driven in one end, after which the pipe is placed in a perpendicular position and filled with sand. The sand is packed by hammering along the entire length of the pipe with a mallet. Packing is continued until the sand level remains constant. The plug is then driven in the pipe, making sure the plug reaches the sand.

The pipe is then secured in a suitable manner for heating and bending. In Fig. 1 the pipe is fastened on an anglesmith's slab. This is a cast-iron plate about 4 ft. by 6 ft. with 1½ in. square perforations. The pipe is secured with "dogs" which are $1\frac{7}{16}$ in. round bars bent slightly over square. With one arm of the dog resting on the pipe, the

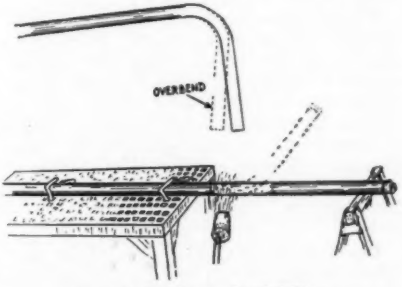



Fig. 1—Bending—Sand Filling.

other arm will jam in the hole with a light hammer blow. The dog is released by tapping on the back of the arm inserted in the slab hole. A board is placed between the dog and pipe on light-gage or annealed pipe. The free end of the pipe is supported as shown, to prevent sagging when hot.

A wire templet with the exact radius of the desired bend is necessary sand bending, from which the location and stretchout of the radius is marked on the straight pipe. The marked stretchout is then heated evenly with torches and bent as shown in Fig. 1. The wire templet is held on the pipe while bending.

If the bend tends to vary from the templet, the pipe must be reheated where necessary, before proceeding. Irregular bending is usually caused by uneven heating, the pipe bending most where hottest. On long radius bends the heating and bending are done in sections, checking closely with the wire templet, meanwhile.

## Rounding the Bend by Overbending

The pipe will stretch a little through bending, causing the sand to become less compact and result in a flattened pipe section in the bend. This is corrected by overbending and opening back to templet as shown in Fig. 1, thus bringing the pipe section back to a circle. The entire radius is heated evenly for opening the overbend.

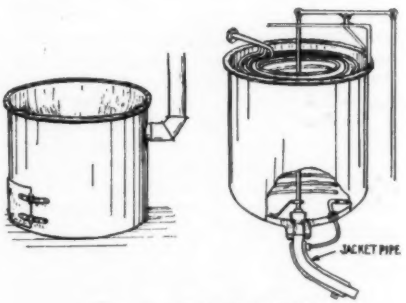
The degree of overbending is determined by the angle and sharpness of the bend and the relative flattening. An approximate rule is to make the maximum overbend about 1/9th of the angle; for example, 10 deg. for a 90 deg. bend. The overbend should be kept within this limit, as opening excessive overbend will cause first, collapse of the side walls of the bend, then puckering in the back. It is better to have too little overbend, rather than too much.

Bends with radius less than two pipe diameters are made in two stages. After bending to one-half of the angle, the pipe is placed in an upright position to repack the loosened sand in the bend. It is best to remove the top plug while repacking. When the sand level remains constant, the plug is again driven in and bending completed.

## Bending with Rosin Filler

For many years rosin has been used as a filler for cold bending of copper, brass, and other copper alloy pipe and tubes. Its usefulness lies chiefly in the facts that it is low in cost, can be readily melted and poured into the pipe and it can be recovered for further use. Rosin is quite fluid at temperatures of 300 to 350 deg. F., and will flow under its own weight at considerably lower temperatures. It has good adhesion to metal when applied molten and allowed to cool. When poured into pipe, prior to bending, it should be heated to a temperature of 350 to 400 deg. F., so that it will not solidify before the pipe is completely filled. During cold weather and especially with small diameter pipe, preheating of the pipe with low pressure steam is recommended.

To melt rosin prior to pouring into the pipe, an iron pot or a steam heated, jacketed kettle, or one equipped with coils, is recommended. Rosin melts at about 200 deg. F., fluidity increasing with higher temperatures. At 300 to 350 deg. F., a gallon of rosin weighs about 8 pounds. In this temperature range the specific heat is about 0.5. Steam at 100 pounds pressure will be adequate to melt rosin and maintain it at 300 deg. F. In using an iron pot, it is usually located near a pit in which the pipes are placed for filling. The pot is set in a stove as shown in Fig. 2. Wood or gas is used as fuel. As rosin is inflammable, a close-fitting cover is necessary to smother the fire if the rosin in the pot becomes ignited. The rosin must be kept dry. Wet rosin will prime and boil over, when heated with fire. When poured into pipe prior to bending, the rosin should be heated to a temperature of 350 to 400 deg. F., so that it will not solidify before the pipe is completely filled. During cold weather and especially with a small diameter pipe, preheating of the pipe with low pressure steam is recommended.




Figs. 2 and 3—Rosin Pots.

Fig. 3 shows a steam kettle for melting rosin, steam at a pressure of 90 to 100 pounds being used. A triple coil of 1" or 1¼" iron pipe with the coils about 3 in. apart, is fitted in the kettle. The kettle is sometimes steam jacketed for greater efficiency. The melted rosin is run off through the bottom, the flow being controlled by the plug and lever arrangement as shown. A jacketed tail pipe, heated by the coil drain is bolted to the outlet.

By erecting the kettle in an elevated position, the rosin can be conveyed direct to the pipe through a gutter.

Wet rosin, melted with steam pressures up to 100 pounds will not boil over, as the temperature of the melted rosin will be just below the priming point.

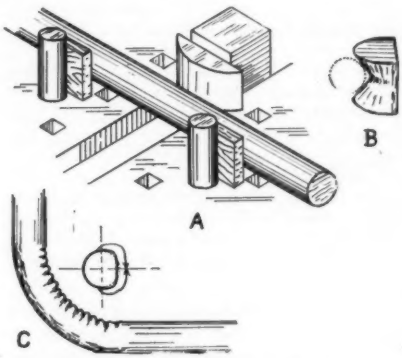



Fig. 4—Bending—Rosin Filling.

Melting is somewhat slower than with fire and the fluidity will be less. For this reason, long pipes, less than 2 in. in diameter, should be warmed before filling with steam melted rosin, as a cold pipe is liable to cool and set the rosin before it reaches the bottom. Sufficient time must be allowed to cool rosin-filled pipes before bending. Pipes over 6 in. in diameter should cool at least 24 hours. The pipe may feel cold to the touch, earlier, but the core is likely to be soft. The rosin will contract upon cooling, leaving a long conical depression on top, which must be refilled. A plug is driven in the pipe when the rosin is hard. Wood plugs for rosin-filled pipes are 1 in. to 1½ in. thick, with the grain transverse. They are driven flush with the pipe ends.

The pipe is placed in the bending press for bending to templet as shown in Fig. 4-A. Blocks of wood are placed between the pipe and pins to prevent indentation and to facilitate the necessary creeping of the pipe while bending. A suitable form is placed between the movable bending block and the pipe. The block is then moved forward, bending the pipe between the pins. If the radii of the form and templet vary, the bending is done by degrees, backing the block and readjusting the pipe in the pins to suit the wire templet.

Bending forms for presses are usually straight faced so they can be used for any diameter pipe with the same radius. The V-shaped form, shown in Fig. 4-B, is sometimes used for sharp bends. It can also be used for various diameters. Frequent adjustment of the pipe while bending is necessary with this form.

The throats of rosin-filled pipe bends will pucker as shown in Fig. 4-C. This puckering is beneficial as it prevents undue thinning in the back of the bend. The formation of the puckers should be watched while bending. The extent and depth of the puckers depend on the radius of the bend. If they tend to become too deep, it is best to make the bend in two operations, a necessary requirement for radii of less than two diameters. Deep puckers are liable to double over and kink while hammering out.

The puckers are hammered out and the bend rounded before melting the rosin out of the pipe. A spanker is used on the side walls and back. Planishing hammers with faces suitable to the contour are used in the throat of the bend.

The bend section will be flattened and distorted approximately as shown. Rounding is started by hammering down the side walls with a spanker. The resulting throat ridge is then hammered with planishing hammers, working it down toward the throat center as shown by the arrows, in the course of which the puckers will be hammered out. After rounding, both wood plugs are broken out, the pipe is suspended and the rosin run out by heating the pipe with a torch. The bottom pipe end must be round, as the outcoming rosin core is hard, only the outside that is in contact with the heated pipe melting. The pipe is heated beginning at the bottom end and working up, the end being kept well heated to prevent plugging. When the pipe is cleared, the torch is played into the pipe for a moment to burn out the remaining film of rosin, care being taken not to anneal the pipe.

The pipe may also be cleared of rosin by playing live steam through it. To completely remove all rosin, the pipe should be flushed out with a solvent such as 300-400 deg. F. mineral spirits, kerosene, turpentine or other suitable solvent or it may be swabbed out with similar solvent. Where caustic soda will not be harmful, the rosin remaining on the pipe may be removed by boiling in a 10% solution of caustic soda, followed by thorough rinsing with water. When the bent pipe is subsequently annealed, the film of rosin may be burned out in the annealing furnace. It is best to let the pipe stand until it has cooled to room temperature before any solvents are used for cleaning.

In removing rosin from long lengths and large diameter pipe, it may be preferable, instead of using the torch, to place the pipe in a suitable furnace at low heat to melt the rosin.

In the use of rosin, it is not advisable to heat this filler excessively, because it will decompose to form oils which make it softer and sticky.

This decomposition becomes rapid at 600 deg. F., and is appreciable at 550 deg. F. The flash point of rosin is about 410 deg. F., but it may be safely heated considerably higher, providing it does not come in contact with a flame. The vapors arising from rosin are combustible and should be prevented from coming in contact with open flames or super-heated surfaces. Keep free water out of rosin—it causes violent foaming when the rosin is heated above its fusion point.

In small shops where rosin is used only occasionally, and in small quantity, the rosin may be heated in any small steel, copper or other metal container, over a torch or on a hot plate. Care should be taken to prevent heating above 500 deg. F.

Rosin is sold in paper bags, wooden barrels, or light-gage metal drums. It comes as a solid cake weighing from 100 to 550 lbs. net, depending on the kind of package. To prepare it for melting, usual practice is to break open the package and then break the solid cake into lumps about the size of a fist. In this form, it is easily shoveled into the melting kettle and easily fused. A 100-gallon kettle will readily hold 500 lbs. or a drum.

The molten rosin may be removed from the melting kettle through an outlet valve in the kettle or ladled out, or, if in a small kettle, poured from the melting kettle itself. A funnel or gutter should be used to guide the molten rosin into the pipe, One end of the pipe should be plugged with a tight-fitting wooden plug, metal plug, clay plug or other suitable means. The entire length of pipe should be filled with molten rosin, then it should be allowed to stand until the rosin has cooled and solidified. The time required for cooling will depend on the size of the pipe. Small, thin-walled tubing will cool most rapidly and large-diameter pipe will take much longer. Allowance of one hour or longer per inch of diameter is suggested. Rosin contracts on cooling and the amount of contraction will depend on the temperature at which the rosin is poured into pipe—the higher the temperature, the greater the contraction.

## Good Points of Rosin as a Filler

In addition to the advantages mentioned above, rosin has the following good points and limitations, as a filler for pipe bending:

1. It may be used on copper for all cold bending.

2. On annealed copper pipe, rosin packing yields a uniform bend, free from kinks and steps and holds to correct dimension. Annealing need be applied to the bent portion only.

3. If not heated in excess of 600 deg. F., it has a useful life of 30 days or more of continuous use. It is readily available in most manufacturing areas.

4. Rosin is not recommended for brass pipe bending, since it will not withstand the high temperature normally employed, nor for hot bending of copper pipe. For cold bending, however, it is entirely satisfactory.

Any grade of well-strained gum rosin or any of the commercial grades of wood rosin may be used for this purpose. A medium grade of wood or gum rosin, such as H or I grade, is suggested. However, FF wood rosin and Belro rosin have been successfully used. These latter grades foam to some extent when heated and are less easily removed with petroleum solvents. During cold weather, the addition of a small amount—½% of rosin oil or heavy paraffin oil to the rosin may be desirable, to lessen the brittleness of the rosin.

*(To be continued)*

# News Briefs on War Regulations

## Regulation Enables Increase in Prices

SO that there may be an adequate supply of repair and maintenance services for mechanical, electrical and gas equipment and appliances used in the home, in hospitals, hotels, schools and business places, the Office of Price Administration issued Supplementary Service Regulation 22 to MPR 165, effective December 27, 1943, which provides a special regulation that enables some suppliers to increase their prices.

In normal times a great deal of such service is rendered at or below cost as an accommodation to customers, in order to build good will leading to purchases of new equipment from the supplier, OPA said. In other instances, repair and maintenance is the chief feature of the supplier's business, but increases in labor costs for skilled mechanics since March, 1942, call for adjustment of customers' prices if suppliers are to be able to continue in business. Ceiling prices at March, 1942, levels, which have obtained until now, do not take into account either of these circumstances.

While this action will result in higher prices for repair and maintenance services in a number of cases, it will help to assure continuance of such services and thus to keep in operation equipment now being used by consumers in the almost total absence of available new equipment or appliances, OPA said. The war has caused the virtual stoppage of new manufacture of such commodities for civilian use.

The regulation enables suppliers who charge on the basis of a customer's hourly rate, to continue charging at their highest March, 1942, prices, if they chose, but offers alternate methods of determining ceiling prices.

The alternate methods are calculated to afford a margin over direct labor costs that is comparable to that generally obtained in the automotive and farm equipment repair field. They are stated by OPA to afford prices that are fair and equitable, and in compliance with the Emergency Price Control Act of 1942.

A supplier of the services who employs mechanics may now choose one of four ways for use in establishing his maximum hourly charges to the customer. The four methods are:

(1) Charge the highest customer's hourly rate that the seller charged in March 1942.

(2) Charge the customer for each hour of service a price that is double the average basic hourly wage rate paid on October 3, 1942, to employees performing the particular type of service. (October 3, 1942, is the date when wage rates were stabilized under the Economic Stabilization Act.)

(3) Charge the customer 60 cents more per hour of service than the average basic hourly wage rate paid on October 3, 1942, to employees performing the particular type of service.

(4) If the supplier employs no more than eight employees, and is exempt from wage control by the National War Labor Board, add to the customer's hourly rate determined under either 2 or 3 above, an amount equal to the increase since October 3, 1942, in the average straight-time hourly rate for mechanics performing each type of service. (A price established on this basis may not be changed oftener than once in 30 days.)

A person who does not have any employees may use either one of two methods to determine his charges, as follows:

He may charge the highest hourly rate that he charged in March, 1942, for the same service to a purchaser of the same class, or

He may charge the maximum hourly rate that is charged by his most closely competitive seller who does employ mechanics to perform the service.

The regulation provides certain permissible minimum charges for service calls. It also specifies record-keeping requirements, and calls for the furnishing of invoices to purchasers. Details of these requirements are set forth in the text of the regulation.

The regulation affects electric fans, lamps, refrigerators, refrigerating equipment up to 25 horsepower, air conditioners up to 25 tons capacity, sewing machines, vacuum cleaners, washing and ironing machines, kitchen equipment and appliances, radios and phonographs, and similar articles. It does not, however, include gas unit heaters, furnaces, industrial equipment, water heaters, oil burners, typewriters, adding machines, dic-

tating machines, duplicating or other office equipment.

OPA said that it soon will issue a Services Trade Bulletin explaining in detail the steps to be taken and providing a convenient form for making the necessary computation in adjusting prices.

A complete copy of this order may be obtained from the Office of Price Administration, Washington, D. C.

S S S

## Preference for Repair Parts Revised and Continued

UNDER Limitation Order L-38, as amended December 6 by the War Production Board, the procurement of industrial and commercial refrigerating and air conditioning machinery and equipment is greatly simplified.

The revised order provides that no person shall deliver and no person shall accept delivery of any new system or new parts except pursuant to an approved order, which may now be any order placed in accordance with any CMP Regulation or any preference rating order, any order approved on Form WPB 2448 or 2449 or any order for the direct use by the Army, Navy, Maritime Commission or War Shipping Administration.

This provision does not relax any of the present restrictions on the essential uses for which refrigeration and air-conditioning equipment may be delivered, but merely provides for the use of existing CMP Regulations and preference rating orders, the use of which will eliminate a considerable number of the applications now received by the War Production Board for the smaller equipment.

Under Order P-126, service agencies are extended preference ratings from AA-1 to AA-5 for emergency maintenance parts and materials (R.S.E. October 1943, p. 22). Also under CMP Regulation 9A, "A repairman may buy as much other material and repair parts as he needs for his maintenance and repair work." There is a provision also that no person shall deliver new systems or parts to any person except on an order bearing a rating of AA-5 or higher. This means that deliveries from one manufacturer to another or from a manufacturer to a dealer or distributor or by a dealer to the ultimate consumer can only be made on an order bearing a rating of AA-5 or higher. Formerly the delivery of equipment by a manufacturer to a dealer or distributor was permitted on an unrated order.

Five additional items have been added to List A, the delivery of which may be made unrestricted, but the production of such items is prohibited for any purpose. The new items added to List A area are as follows:

Drinking water coolers, non-mechanical.

Drinking water coolers, mechanical, bottle type.

Drinking water coolers, mechanical, pressure type, capacity less than 5 gal. per hour, 80° to 50° with 80° ambient temperature.

Self-contained air-conditioning units, 2 h.p. or less.

Wall type display cases, refrigerated.

Although items on List A may no longer be produced, the revised order does permit the assembly of any List A item if 75 per cent (by weight) of the total material to be incorporated in the item was fabricated and in the producer's inventory prior to April 6, 1943, and the material cannot be used in the assembly of any system or parts not shown on List A.

List B (items that may be delivered to specified users and for special uses) has been revised so that any of the permitted users may assign a rating of AA-5 for the delivery of any of this equipment by a certification in accordance with Priorities Regulation 3 unless the orders are otherwise rated. Delivery of items on List B to other persons may be permitted if they receive an approved order on Form WPB 2448 or 2449.

Refrigeration systems for farm milk coolers have also been added to List B and may be delivered for direct use by any person who has a purchase certificate from a County Farm Rationing Committee and also to any producer of farm milk coolers operating under Orders L-257 or L-257-a. Other changes on List B include the permitted delivery of mortuary refrigerators to institutions and hospitals and the permitted delivery of portable bulk ice makers for the direct use by the Maritime Commission and War Shipping Administration. Items on List B may be produced in accordance with the production provisions of paragraph (h) of the order.

To eliminate the necessity of the applicant filing both a Form WPB 2448 or 2449 and a WPB 617 where construction is involved, the revised order provides that where the cost of construction (exclusive of the cost of the prime mover, compressor, condenser, receiver, evaporator surface, controls, indi-

rect cooling units and cooling towers) is more than $5,000, the applicant shall apply for the whole project, including the refrigeration or air-conditioning system, on Form WPB 617. Where the cost of construction is less than $5,000, the system shall be applied for on Form WPB 2448 or 2449 and if authorization is granted it will be accompanied by any necessary permission to "begin construction" under Conservation Order L-41 and no separate application on WPB 617 need be made.

As the revised order requires a rating of AA-5 or higher for the delivery of any equipment, Forms WPB 541 or WPB 547 may be used by dealers or others who are not producers and who are purchasing for inventory or resale. If the dealer or other person is at present using Form WPB 547 to obtain ratings for equipment and parts, it is recommended that he continue to use this form in applying for refrigeration equipment and parts for inventory.

The production restrictions of the order have been revised so as to provide a greater flexibility of production and to provide a means for producers to begin the production of restricted refrigeration equipment as materials become available. After a minimum production has been established, the demands will regulate the production by the number of approved orders and the amount of critical materials available. Beginning January 1, 1944, and during each later calendar quarter, no producer shall manufacture or assemble more of any class of new systems and parts as shown on List D than his quota for that class. This is exclusive of repair and maintenance parts. The quota for any class is in terms of aggregate dollar volume and may be the greater of the following two quantities:

1. The dollar volume of all unfilled orders on hand rated AA-5 or higher for that class of new systems and parts, or

2. One-sixteenth of the aggregate dollar volume of that class of new systems and parts (other than items on List A manufactured by him during the calendar year of 1940, in addition to his current production required to fill all orders for direct use by the Army, Navy, Maritime Commission or War Shipping Administration.

S S S

Hilding C. Anderson
Cold Spring, N. Y.

I have been a subscriber for a long time and like the magazine quite well.

## Revised Charges for Overtime Work

TWO methods that may be used by service shops in the various repair trades in setting charges to customers to offset increased costs resulting from the payment of overtime wage rates were outlined in Supplementary Service Regulation 21 to MPR 165, effective December 27, 1943 by the Office of Price Administration.

They apply to all suppliers of services whose prices are based on an hourly charge to customers for labor under the terms of the Services Regulation (No. 165).

This action was made necessary, OPA said, because of the decided trend in the repair business toward a lengthening of the work week and the payment of overtime wages beyond the first 40 hours. The 48-hour week has been made mandatory in many areas by rulings of the War Manpower Commission. In many other cases it has been adopted voluntarily in order to use available workers more efficiently. Charges for most repair services were frozen generally at the March, 1942, level. In authorizing an increase in customers' rates where overtime service is provided, OPA has recognized the problem that added overtime costs have imposed upon many establishments.

A choice of two pricing methods is now allowed to shops with mechanics working 48 hours a week who are paid at overtime rates for the last eight hours.

First, an additional charge is permitted for work done in overtime hours, which may bear the same ratio to the regular hourly charge that the overtime wage rate bears to the regular wage rate, providing the customer requests this overtime service and is willing to pay extra for it. Thus, if a shop pays time and half for overtime it may charge 1½ times its regular charge for work done in overtime hours, providing this is agreeable to the customer. Under the same conditions, if it pays double time for overtime, it may charge double the regular hourly rate for overtime work.

This method does not always work out well in practice, since it is not easy to determine exactly which hours in a work week are to be considered as overtime hours. For example, some shops now work one hour longer for 5 days of the week and remain open 8 hours longer on Saturday. Under these conditions it is obvious that many jobs that were started in regular hours will

need some part of the overtime period for their completion. OPA recognizes that this makes the pricing of overtime work extremely difficult, particularly so when it also involves securing permission from the customer before the extra charge is made. To overcome these difficulties a second method is permitted.

Under the second method, an upward adjustment of the regular customer's hourly charge may be made in an amount that approximately represents the additional overtime cost. Where this method is used, all jobs are priced on the same basis during the full 48 hours of the work week, and each customer, by paying slightly higher prices, absorbs his share of the extra cost. The amounts that may be added are as follows:

Where overtime is paid for at 1½ times the regular rate, shops with customers' hourly charges under $1.75, may increase the hourly rate by 5c. Those whose hourly charges range from $1.75 to $3.49 may increase the hourly rate by 10c. Those whose hourly charges are $3.50 or more may increase the hourly rate by 15c.

In exceptional cases, where the eight hours of overtime are paid for at double the regular rate, permissible increases are 10 cents on hourly charges below $1.75, 20 cents on charges from $1.75 to $3.49, and 30 cents on charges of $3.50 or more.

## Commercial Refrigerators and Water Coolers

SPECIFICATIONS for the production of commercial refrigerators and electric water coolers for land use were announced December 29 by the War Production Board. "Reach in and walk in" refrigerators formerly were restricted in manufacture and electric water coolers were manufactured only for ship use. The action was taken by adoption of schedules I and V to limitation order L-126.

## Copper Wire for Dealers

UNDER CMP Regulation 9, issued by the War Production Board, November 26, specific information is furnished as to how retailers may get copper wire for retail sale. Under this regulation, a retailer who was in business August 1, 1943, may order for delivery in any calendar quarter up to $50 worth of wire. If he needs more, he may buy up to one-sixteenth of the amount sold during 1941.

## Increased Use of Copper and Aluminum Allowed

THE War Production Board on January 11 took steps to relieve manufacturers of commercial and industrial coil or tube assemblies for refrigeration condensers or coolers, and at the same time to make field service operations on refrigerators easier to handle by changing specifications to permit greatly increased use of copper and aluminum strip and tubing in the manufacturing processes.

Relaxation of the specifications covering use of these critical metals will allow the industry an approximate increase per quarter of 300,000 pounds of copper strip, 660,000 pounds of copper tubing, and 200,000 pounds of aluminum strip. There will be a corresponding decrease of 500,000 pounds of steel strip and 400,000 pounds of steel tubing used per quarter as a result of the substitutions.

In terms of manpower conservation as a result of the easier handling properties of copper and aluminum, the industry, consisting of some 25 companies, estimates that 700,000 man-hours per year will be saved, equal to 30 to 40 per cent of the entire total of industry man-hour operations.

The two amendments, which change schedules III and IV of limitation order L-126, will permit the following changes in manufacturing of coil or tube assemblies for coolers of the finned type only, for coil or tube assemblies to be used in farm milk coolers of the immersion type and for pipe and tubing in water and brine coolers of the shell and tube type:

Remove the restrictions on the thickness of fins used in the fabrication of coil or tube assemblies for air cooling.

Permit the use of non-ferrous metals in the fabrication of replacement coil or tube assemblies when the assembly is to replace an existing assembly or like metals.

In addition to the relaxations permitted on the manufacturing processes, service men will be permitted to use copper or copper base alloy pipe or tubing for refrigerant connections.

It is estimated that this change in specifications governing refrigerant connections will require an industry increase of approximately 50,000 pounds of copper per quarter. The amended order still prohibits the use of copper or copper-base alloy pipe or tubing for service connections such as water and drain lines.

# Service Pointers

## Practical Service Men Tell How They Meet New Repair and Service Problems

**UNDER this department a number of practical service men show a commendable cooperative spirit in passing on to others information on special repair and service problems that may be of much value in these trying times of material scarcity and shortage of competent help. We believe if more readers would send similar contributions, making THE REFRIGERATION SERVICE ENGINEER a medium for the exchange of information on service, much benefit would accrue to all. Similar contributions are solicited from all readers.**

### NEW DESIGN FOR COOLING DRINKING WATER

WATER in a ship's reservoirs often reaches a temperature of 100° F. Ordinary water coolers will not handle this condition satisfactorily. Westinghouse engineers solved the problem of providing cool drinking water for our fighting men when on shipboard by using a pre-cooler. Normally 60 per cent of the cooled water goes down the drain. The pre-cooler makes this waste water help cool the incoming supply.

The incoming water coil (⅜ inch tubing) is brazed to the inside of a four-inch diameter drain pipe, thus the waste water cascades over the fresh-water tubing, providing a very efficient heat transfer. Photo shows the new cooler being tested; it must withstand a 150 pound shock test and must operate even though tilted at intervals to an angle of 40° with the vertical.

* * *

### COMPANY POSTAL CARD

ANOTHER company postal card for writing short messages is introduced by E. L. Fair of the Modern Refrigerator Service, Jackson, Mich. With the name, address and telephone number of the company illustrated with design at the top, this makes an effective and economical medium for sending short messages to customers and others.

## FLARING BRITTLE TUBING

By E. L. Fair

THE method of flaring brittle tubing, described by Garret Underwood in the December issue of THE REFRIGERATION SERVICE ENGINEER, suggested to me that if desired to eliminate the moisture production, this can be done by heating the end of the tube to a bright red and then flaring it as soon as it is cool enough to handle. Care should be taken not to make the flare too full when working with old tubing.

S S S

## HERMETIC NOISY ON STARTING

A QUESTION often received relates to a noisy condition occurring in hermetic units when they are first started after an extended shutdown. After having been shut down for a period of time, the units will tend to be somewhat noisy when first started. During the shutdown a certain amount of refrigerant condenses in the compressor base and, upon starting, this liquid refrigerant is circulated along with the oil, resulting in a noisy condition. This does not indicate that anything is wrong and the machine will quiet down to a normal level although this may take a little time, especially if the room temperature is cool.

This noise at starting may be eliminated on machines equipped with an oil conditioner, such as General Electric, by plugging the connecting cord into the outlet several hours before the machine is started. This allows the oil conditioner to heat the oil and drive off the liquid refrigerant.

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## WURLITZER REFRIGERATOR

By Edwin J. Smith

I NOTICE Question 574 in the December issue of THE REFRIGERATION SERVICE ENGINEER refers to the Wurlitzer refrigerator. This refrigerator has an open type unit made by Universal. It has an automatic expansion valve and a continuous tube evaporator. It uses either Freon or methyl gas (see name plate on unit). The proper charge would be about one pound. The setting for methyl would be six to eight pounds back pressure and for Freon 12 to 15 pounds back pressure. About one-half pint of oil is the proper charge of oil or the half way mark on the shaft. The oil charge must be watched as a little overcharge on this unit will cause slugging on the start and brake the valves about every time. This is due to the high back pressure and the liquid in the suction line at the start.

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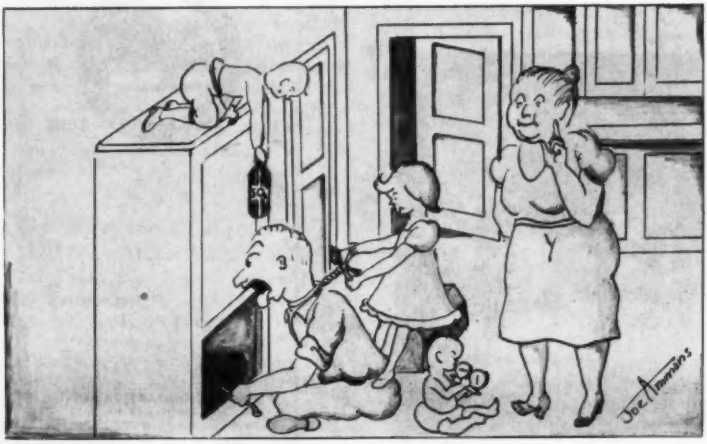
*Now if the Children Start Bothering You Just Shoo Them Out*



# Refrigeration Equipment in War Plants

HOW refrigeration equipment serves in the production of aluminum aircraft parts at the Santa Monica plant of Douglas Aircraft Company was told recently by an official of the company, which has installed Carrier refrigeration equipment in the Santa Monica plant.

Temperature, it is explained, is the principal factor in strengthening the comparatively soft aluminum alloy so it will become virtually as hard as steel and will stand up under the stern test demanded in Douglas bombers and cargo planes.

The aluminum alloy, in the shape of various aircraft parts, is first brought into the big heat-treat room at Douglas and plunged into a tank containing a solution of nitrate salt at 950° F. After a relatively brief period in the nitrate heat bath, the alloy is whisked into the air and immersed in a water quench tank which is kept at 42° to 45° F. by Carrier refrigeration equipment. The tank measures 4 x 20 x 6 feet and has a capacity of 3,500 gallons.

The quick dash into the water quench tank is necessary as a "delayed" quench causes grain segregation, with subsequent corrosion and weakening of the metal.

Following emergence in another tank, if not needed for immediate stamping, the material is stored at 10° F. in order to retain its annealed state for stamping or extruding at a later date. Otherwise hardening would set in within two hours and the anneal lost completely in three days. Aluminum parts are held in storage for as long as thirty days. The cold storage room is held at proper temperature by Carrier refrigeration equipment.

### Gauges Control Temperature

When metal parts of precision war mechanisms made in plants located in the heat of the deep South fit perfectly with parts made in plants up North, no small portion of the credit goes to operations conducted under controlled temperature and humidity conditions in the gauge room of the Cincinnati Ordnance plant of the United States Army.

In the gauge laboratory at Cincinnati, air conditioned by Carrier equipment, are master gauges for calibrating the gauges that are used by manufacturers making Army supplies. Here checking is done to insure that gauges all over the country are in accord so that parts from one area will fit those from another.

To avoid variations in the gauges due to weather, constant conditions are maintained within the room. Temperature is held at 68° F. with a variation not to exceed 1° F. and the relative humidity is held below 50 per cent.

The gauges tested include those measuring length to 1/10,000,000 of an inch, electrolimit gauges, thread gauges, plug gauges and depth gauges.

The purpose of air conditioning in the room is to have the same conditions for testing at all times. Temperature variations are not permitted as they will cause changes in dimensions of metal and will make the gauges read inaccurately. Control of relative humidity is important in a gauge room since no rust or corrosion, due to moisture condensation, can be permitted. In addition, air must be dust free for the fine instruments to remain accurate.

In laying out the air conditioning installation, engineers of the Cincinnati Air Conditioning Company, Carrier dealer, took into account the hottest day on record in Cincinnati (108° F.) and the coldest day in the records of the Weather Bureau (—23° F.) so that even on extreme days the calibration work could be carried on.

# Insulation Reduces Load on Cooling System

EFFECTIVE use of insulation to reduce the load on the air conditioning system is embodied in the design of the huge altitude wind tunnel for research on aircraft engines, now being built at the Cleveland airport by the National Advisory Committee for Aeronautics.

The tunnel will be used by the committee's aircraft engine research laboratory to improve the performance at high altitudes of aircraft engines and engine installations for the Army and Navy air forces. Provision is made for the creation in the tunnel of a wind velocity of 500 miles per hour, and other flight conditions encountered in the stratosphere where planes and engines must cope with temperatures that fall as low as 48 degrees below zero, Fahrenheit; and air pressures thinning to four pounds per square inch.

## Intermittent Cycle

A major factor in calculating the load imposed on the air conditioning system required to create these conditions, is the intermittent cycle on which the tunnel will be operated. Comparatively short periods of operation will be broken by periods of 24 to 48 hours during which test installations will be removed or changed or others set up. Lacking provision to maintain low temperatures during such set-up periods, it would be necessary to reduce the tunnel temperature from atmospheric temperature to as low as minus 48 degrees before each test period.

## Insulation in Walls

To aid in creating the desired differential between atmospheric and tunnel temperatures, and to maintain the differential so far as possible during set-up periods, approximately 70,000 square feet of Fiberglas insulation are installed in the walls of the tunnel. The insulation, in the form of metal-mesh blankets two and a half inches thick, is placed between an inner steel shell ranging from one-half to fifteen-sixteenths of an inch in thickness, and the outer skin of the tunnel consisting of one-eighth-inch-thick welded steel plates.

The tunnel air is cooled by a refrigeration system using 14 centrifugal compressors. The compressors, each powered by a 1500 horse-power motor, are housed in a nearby building. Also housed in a nearby structure are four exhauster pumps, each driven by a 1750 horsepower motor.

The function of the exhauster pumps is to draw air from the tunnel, including exhaust-filled air, at a rate up to 6,000 pounds per minute. Dry, cooled "make-up" air

can be let in to maintain an even pressure. A twelve-blade, laminated-wood, drive fan, 32 feet in diameter, will produce wind velocities up to 500 miles an hour. The fan is powered by an 18,000 horsepower motor.

### Insulation Resists Vibration

During test periods, walls of the tunnel will be subjected to vibration, making it necessary to employ an insulation material that will not shake down and leave empty spaces for the inflow of heat from the outside atmosphere. Fiberglas was selected largely because the interlaced glass fibers form a resilient mass that it is believed will withstand the effects of such vibration. Other considerations were the incombustibility of the material, and the fact that it is not harmed by moisture due to condensation or other causes.

The Fiberglas insulation was manufactured by Owens-Corning Fiberglas Corporation and supplied through the Crane Company.

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# Insulation Controls Pressure in Tank Trucks

ANOTHER unusual demonstration of the effectiveness and versatility of modern heat insulating materials is offered by the Fiber-glas-insulated tank trucks employed by the Cardox Corporation, Chicago, to transport liquid carbon dioxide to industrial plants in which the Cardox fire extinguishment system is installed.

The system involves storing up to 125 tons of the liquid $CO_2$ in a centrally located tank in the plant. To keep the $CO_2$'s pressure at a relative low of 300 pounds per square inch while being carried to the plant in the company's trucks, the temperature must be maintained at zero, Fahrenheit, even though atmospheric temperatures may range near the 100 mark.

### Sides and Ends Insulated

Sides and ends of each truck's tank are insulated with three two-inch layers of Fiberglas in the form of boards sufficiently flexible to fit on a curved surface. Vapor barriers are installed to prevent condensation of moisture caused by passage of warm air through the insulation to the cold surface of the tank.

Ends of the tank are finished with mastic. Sides are covered with asphalt paper held in place with metal bands. A metal pan, secured to the channel irons of the chassis, protects the insulation and helps

**Fiberglas-insulated tank truck used by Cardox Corporation for the transportation of liquid carbon dioxide at zero temperature. Not shown is the removable steel shell with which the tank is covered.**

hold it in place on the lower half of the tank. The entire tank, with its "glass overcoat," is covered with a removable metal shell.

The application presents a severe test of the efficiency of the insulation, since any material rise in the temperature of the carbon dioxide would cause a corresponding rise in pressure which would constitute an explosion hazard. Effectiveness of $CO_2$ in extinguishing fires is due to the fact that it reduces the oxygen content of the air below the concentration necessary for combustion, and at the same time cools combustibles and the fire zone below the ignition temperature.

# Post-War Refrigerators

## Financial Writer Offers Visionary Dream of the Future—New Business and Ideas

*NOTE: While refrigerator manufacturers criticize as impractical the fanciful trend of magazine writers and others who visualize startling new ideas for post-war refrigerators, these new ideas continue to receive publicity—if not acceptance. While we do not accept most of the findings obtained from visionary looks into the future as correct necessarily, we believe that it would be worth a service man's time to observe some of the thinking that is being done in that connection. We therefore offer the following preview of the future refrigerator along with a general survey of the industry from "The Wall Street Journal" of New York.—The Editors.*

ALTHOUGH the first new refrigerators after the war will be the 1941 models, they will be followed quickly by mechanical ice boxes with at least half a dozen advanced ideas in design. The housewife may look forward to such features as:

*Freezing compartments.* Freezing the beans, broccoli, peas and strawberries from her garden is surer, cheaper and easier than canning them.

*Frosted foods storage.* Another section will hold the frozen foods she will buy from her neighborhood grocer or delicatessen. These compartments, like the ice-cube trays, will be an integral part of the new refrigerator.

*Many colors.* Before the war refrigerators came only in white, gray and cream colors; but in future years the woman of the house will be able to match the color scheme of her kitchen by the hue of her ice box. The baked-on enamel or plastic finish will be easy to clean.

*Handy interiors.* The thought is to make everything quickly accessible. Some makers are experimenting with revolving shelves like the "Lazy Susans" in the middle of some cafeteria tables.

*Better lighting.* There will be no dark corners hiding foods.

*New materials.* Enamel-coated steel is expected to hold first place, but boxes may come also in stainless steel, aluminum, copper, glass and plastics.

*More compact refrigerating units.* Along with this will be more efficient thermostatic control and better insulation.

*Rectangular shapes.* They will stay because they are best adapted to the established design in building, which generally calls for right-angled structures.

The theme guiding the new planning, one maker says, is to make the kitchen satisfy the new ideas of efficiency that women have gained in their work in war plants. They'll insist upon household gadgets, he says, eliminating wasted time in housekeeping.

The search for better ideas is going on constantly. The General Electric Co., for example, when it mailed out dividend checks recently, included a folder asking stockholders what they would like to have in their post-war refrigerators. The suggestions that come back will be sifted by experts.

### Huge Post-War Sales Seen

The industry expects huge sales of refrigerators in the post-war years, through the release of the pent-up demand and opening of new markets. It also counts on expansion in related fields.

The rapid growth in popularity of frozen food indicates there will be a demand for refrigeration equipment in food processing plants. This in turn means more special cabinets for the grocers and delicatessens handling those frosted items. Much attention is being given, too, to the specific needs of dairymen and farmers, to help them keep milk, butter, eggs, vegetables and fruits fresh for the market. The chemical, metallurgical and pharmaceutical industries, and

hospitals, are constantly finding new uses for refrigeration and temperature control.

Reconversion of the manufacturing plants to peacetime production will be speedy. The Westinghouse Electric and Manufacturing Co. planned its wartime production lines so they can be rearranged quickly for mass output of electric appliances. All makers have their tools and dies readily at hand.

## Demand Piles Up During War

In sizing up its post-war market, the industry counts first on satisfying the demand for refrigerators which has piled up during the war years, when none was made. A survey by he U. S. Chamber of Commerce indicates that upward of 1,750,000 families intend to use their war bonds or other savings for a new refrigerator within six months after the war ends. There are 20 million mechanical refrigerators in use; the industry expects sales for several post-war years to hit 8.5 million, the total for 1941.

A million marriages a year, the current rate, which may be stepped up when the soldiers come home, create as many new family units who are possible customers.

Home-building, held back during the war, is expected to mushroom, calling for 450,000 units annually.

Rural electrification will expand. It is estimated that only 40 per cent of 7.5 million farm dwellings are wired for electricity, and as more get the current, as many more farm wives will want to turn from cooling caves to kitchen boxes. The trade guess is 300,000 units a year going to farms.

The southern and southeastern sections of the United States have been lagging in buying refrigerators. Sales efforts will be redoubled there.

Exports are expected to take 15, instead of 8 per cent of American production. During the past two years the Government has sent great numbers of refrigerating units overseas to military bases. Many of them will never be brought back, just as after the last war it was cheaper to leave motor trucks in foreign lands than to bring them back for repairs. Those left abroad are expected to whet the desire for more; American manufacturers think 500,000 refrigerators a year may go into exports.

Replacements of units in old homes are estimated at 800,000 a year.

A few years before the war the industry expected to equip 50 per cent of the wired and gas served homes in the nation with mechanical refrigerators. Now it is thought 65 per cent may be a modest estimate of the homes to be so equipped, and some are talking in terms of 90 and 95 per cent.

A much wider use of mechanical refrigeration is also expected in food production and industrial fields.

Progressive dairymen and farmers are coming to look upon mechanical refrigeration as a "must." Many of their products are either perishable or quickly lose their freshness and both tendencies can cost the farmer plenty. The biggest profits come from milk that stays sweet, eggs that stay fresh, vegetables that stay green and crisp and fruit that stays firm and bright. Refrigeration is the answer.

## Industries Use Refrigeration

The problem of supplying blood plasma to the armed forces in combat areas was succcessfully met by refrigeration. Two of the vital phases, drying the plasma and freezing it on the inner surface of a bottle, would have been impossible without temperature control. In all these processes, as well as in the various stages of transportation, the temperature range had to be carefully limited to insure arrival of the plasma in effective condition to be used. This is but one example of the medical need for refrigeration.

In the industrial area, there are aluminum rivets which must be held at low temperatures to preserve ductility before before use; chemical processes in which even temperatures must be maintained to prevent deformation or spoilage during setting or hardening periods; steel-making, calling for the control over the amount of moisture in the air to prevent oxidation in tempering; and the making of photographic film calls for low-temperature controls. The refrigeration industry expects the advance of science to provide a constantly expanding market for its equipment.

Finally, a larger market is anticipated in the frozen-food locker plants. Nearly four thousand of these, before the war, enabled families to store meats and other foods and thus cut the cost of living. A conservative estimate is that there will be 10,000 new locker plants constructed in the next three years; some leaders in the industry predict the country can eventually use 50,000 such plants.


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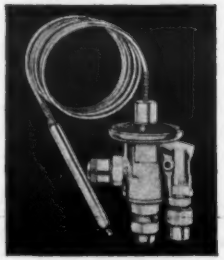

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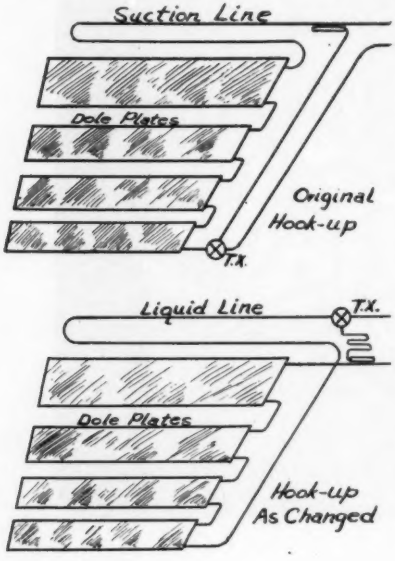
# The Question Box

Readers are invited to send their problems pertaining to the servicing of household refrigerators and small commercial refrigerating equipment to "The Question Box."

## COMPRESSOR SLUGS OIL

QUESTION 579: Recently I was called to replace an oil separator on a Reliance condensing unit—1 hp. The original had exploded rather violently. Upon examining the original, I discovered that in installing, one of the fittings was soldered shut, and it could not leave accumulated oil back into the crank case of the compressor. After installing the new separator and recharging the machine, I set it in motion. It ran smoothly for about 10 minutes when it started to slug. In short, it wrecked the compressor before I was able to stop it by smashing the valve plate, etc.

At first, it puzzled me as to just what caused the slugging. I checked the expansion valve (Alco 2½ ton), but at last I figured that the location of the valve caused the trouble. After repairing the compressor and changing the location of the valve, I find it impossible to get the temperature of the locker room down any lower than 20°. The room is well insulated as it held a temperature of between 20° and 30° for 36 hrs. while the compressor was being repaired. I have sketched the installation to give you an idea of the setup. Any help will certainly be appreciated.




Is there any good reason for the shortage of Iso-Butane? It is next to impossible to obtain any around Milwaukee or Madison. There are many Copelands in this area.

I would like to hear about the application of the capillary tube in 1, 2 and 3 hp. jobs.

ANSWER: One of two things in my estimation, may have caused the compressor slugging, after the repair work you had done on it. The first reason is that there was an excess of oil held in the evaporator and tubing of the system which was forced back in large slugs through the return line, during the first few minutes of operation. Very often, oil will lie dormant in a system for a long time, but after an extended shut-down, it will be stirred up and recirculated with the refrigerant. The fact that the old oil separator was not functioning, would lead me to believe that there was considerable oil in the low-side when the repair was made.

The other possibility is that the expansion valve was stuck in an open position, temporarily permitting liquid refrigerant to return through the suction line. I don't believe that the trouble was caused by the location of the expansion valve, and in fact, your subsequent troubles indicate that the expansion valve should be returned to its original position.

You will note that in the original position, the expansion valve was located very close to the coil—thus, cutting down the friction loss through the tubing between the coil and expansion valve. Furthermore, there was quite a long loop of suction line between the other end of the coil and the location of the thermostatic bulb. This long loop would permit the entire evaporator coil to be flooded with refrigerant before the bulb would feel the temperature of the coil. Thus, the coil would be more completely refrigerated, and would be maintained at slightly lower

temperature, with the same expansion valve setting.

In the change you made, there is a long length of tubing between the valve and the coil which would cause considerable friction loss and reduce the refrigerating effect in the coil itself. The thermostatic bulb is located quite close to the outlet of the coil, and it is quite probable that several turns at the end of the evaporator coil are not completely refrigerated. With the change you have made, the efficiency of this coil has been reduced. I think if I were you, I would change this set-up back to its original, and reset your controls as they were originally found.

I have not heard of anyone using a capillary tube in 1 h.p. units.

## CHANGING FROM $SO_2$ TO METHYL

QUESTION 580: I have been an interested reader of your magazine for a number of years and would like your help in solving a problem I have run into. A customer has a 4-hole ice cream brine cabinet using sulphur and a low-side float with shut off valves on the boiler. The unit is a ⅓ hp. Frigidaire 2-cylinder compressor, F-12 job which someone installed using $SO_2$ gas. Dia. of flywheel on Comp. is 10". This unit is located in the basement—about 15 ft. of tubing from unit to cabinet. ¼" and ½" lines. Now because of a previous bad $SO_2$ leak and sickness resulting, the customer desires to change from $SO_2$.

I am unable to buy F-12 gas, but can get $CH_3CL$. Can you recommend a way of changing this over to a methyl chloride job? What size of pulley would be needed on the motor? Some suggest using a highside float and taking the low-side float ball out of boiler, etc. Another says, get a methyl low-side float, or do away with the brine tank and wind some tubing coils around the ice cream containers and make it a dry expansion system, etc., which would be a somewhat expensive changeover. I would like your advice regarding this matter.

ANSWER: You state that the unit was originally a F-12 system, but was installed using $SO_2$. This makes the problem confusing in that we don't know whether the proper speed changes were made on the unit in converting it from F-12 to $SO_2$.

We can take it for granted that the speed is not too great since the unit had been functioning satisfactorily, but it is possible that the compressor is running much too slow for $SO_2$. In other words, when changing from F-12 to $SO_2$, it is necessary to speed up the compressor, in order to maintain its capacity. Taking it for granted, however, that proper changes were made, it would now be necessary to reduce the speed of the compressor when changing from $SO_2$ to methyl. The change in speed would be approximately one-third, or in other words, a reduction of approximately one-third the size of the motor pulley is necessary.

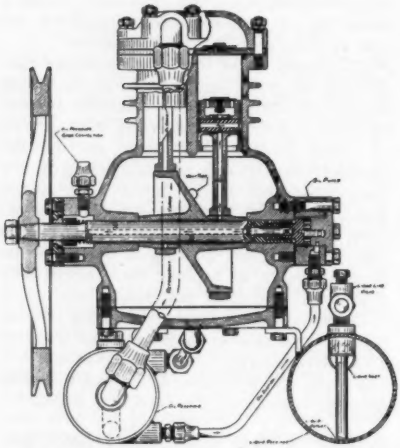
Of course, there are other changes that have to be made, and first of all, it would be necessary to thoroughly clean the system, in order to remove all traces of $SO_2$, and the oil must be changed. Any one of the changes your friends have suggested in the evaporator will work, but I take it for granted, expense is an item in this change-over, and therefore, your choice in using a highside float, or securing a new low-side float assembly to replace the present $SO_2$ float, would be most desirable.

There is considerable data given on this type of change-over in the August issue of THE REFRIGERATION SERVICE ENGINEER. I believe if you will refer to it, you will gain more knowledge of the necessary work.

## WHAT IS THE CIRCUIT THROUGH ICE-O-MATIC UNIT

QUESTION 581: I have on hand a Williams Ice-O-Matic Condensing Unit, Motor C-100 (Serial No. 55163) which is heavily overloaded. I find it very difficult to get enough water flowing through the condenser coils to sufficiently lower the head pressure to where the motor will not overload and kick out the circuit breaker. I would like to have a diagram showing the path of condensing coils through the two large cylinders in the base of this machine. Can you furnish me with such a diagram? Is it practicable to install an oil pressure gauge on this compressor and if so, where should same be connected? What should be the proper oil pressure for this unit? Why are the high and low pressure connections placed as they are in such inconvenient and inaccessible places on the various fittings of the compressor? Why are not these two connections fastened closer to the high and low side connections of the compressor body itself? What is the possibility of installing a discharge service valve in the compressor discharge service line close to the cylinder head, or at least before the discharge service line enters the oil reservoir in the base of the machine?

ANSWER: Part of your difficulty is apparently due to your lack of understanding of the construction of the unit and we are, therefore, including an illustration which, while it was drawn up for an older model, is diagramatically correct and is, therefore, just as applicable to the model you possess.



In your unit, the two tanks you refer to and which are built into the base of the unit are now the liquid receiver which you no doubt have identified as such, and the other, the Williams Ice-O-Matic oil rectifier. You will note from the diagram drawing that the discharged vapors from the cylinder head of the compressor unit are not discharged into this rectifier but simply through it, passing through a copper tube which lies beneath the oil level. After passing through this tube, the high pressure vapor passes on to the condenser either air-cooled or water-cooled, or in the case of the combination unit, both air and water cooled. The space within the oil rectifier is low pressure and, as far as servicing is concerned, can be considered a part of the crank case. The suction shut-off valve is located on the side of the case in a conventional manner, and has a ⅛" plug opening for installing a compound gauge to observe the low-side operating pressure. It will now be evident from the foregoing information that the pressures indicated on this gauge, therefore, covers the pressure in the oil rectifier as well. The oil rectifier is so designed that it is only about half filled with oil. This permits a larger liberating surface on the oil with the result that the heat of compression absorbed by the oil readily vaporizes any refrigerant which might get into the oil and this, supplemented with a dry crank case, permits the compressor to operate without oil slugging.

In regard to the location of the discharge shut-off valve, there should be no objection to this location after following through on the foregoing data. Should you desire to determine the oil pressure, it is just a matter of pumping the crank case down to zero, then stopping the unit, and connecting the gauge to the fitting provided on the oil seal cavity. At the same time, a gauge must be installed in the suction shut-off valve. The unit may now be put in operation and the difference in the reading between these two gauges represents the oil pressure over and above the crank case pressure. This should be between 30 and 50 lbs. under normal operating conditions on the unit to which you refer.

You state in the forepart of your letter that the unit is badly overloaded and there is, of course, no remedy other than reducing the load. The unit is designed to deliver a certain amount of refrigeration and when pushed beyond that limit, there is no alternative but for the safety switch to break the circuit just as you report, in which this device is simply serving the purpose for which it was incorporated.

## SUPER-COLD COIL CLOGS UP

QUESTION 582: I have been called to service a Super-Cold ice cream freezer and hardening cabinet combination three times during the last eight months for the same trouble. The first time this trouble occured, I found that the coil in the hardening cabinet was plugged. While the cabinet was still cold, I took off the thermo. valve and tried to blow through the coil using a heated methyl drum for pressure. This did not work, so then I filled the cabinet with hot water. Right away the coil cleared and the methyl from the drum went through.

I wasn't sure whether the trouble was caused by moisture or oil logging, so I blew carbon tetrachloride through the coil and then put a vacuum pump on it for 48 hours. I then installed the valve again and purged the line, and also refilled the dryer with Silica Gel. The hot water was left in the box until it cooled off. The next two times this happened, the only thing that was done was to change the dryer and add plenty of hot water until the box had cooled down.

This last time, the screen on the dryer became plugged with a fine brown powder, and after this was cleaned and the dryer refilled, the refrigerant would not pass through the coil. The coil of the cabinet is made of ⅝ tubing. The tubing from the valve to the coil is ¼". This is a remote installation with the condensing unit about 40 feet from the cabinet.

ANSWER: In general, your trouble with the Super-Cold ice cream freezer sounds as though it is due to moisture, particularly since heat will clear up the trouble temporarily, and due to the brown substance found at the screen of the expansion valve. This brown powder is a product of the oil and moisture aggravated by the heat of condensation. However, it would seem impossible that sufficient moisture can be in the system to clog the coil itself, while at the same time, the expansion valve may remain free. Moisture will always freeze at the expansion valve before giving trouble in any other point, and it usually only requires about a drop of moisture to create trouble at the expansion valve. It would require a great deal more than this to freeze up the opening through the coil itself.

It would appear, then, that your trouble is not only moisture but due to the grade of oil being used in the system. It is quite probable that this oil is too heavy for low temperature systems, and is congealing in the coil, preventing passage of the refrigerant through it.

I believe it would be a good plan to warm up the system, then pump down the entire charge in an effort to get all the oil to return to the compressor, then recharge the compressor with the proper viscosity oil. You have not given me enough information on the system to determine what the viscosity should be, but I presume the information you have on hand will give you the kind of oil required.

## CROSLEY PUMPS OIL

QUESTION 583: I have a Crosley unit that will not run a cycle without throwing the overload switch off. I have had this unit apart and I found the compressor without oil. I found everything in good order in the compressor regardless of the lack of oil. I dumped oil out of the coil and the condenser. I installed a new capillary tube and a new seal. I put in oil and gas with the frost line about an inch along the suction tube. The unit ran about three weeks and now it does the same thing again. Just before it stops, it sounds as if it was laboring, but the head pressure stays normal.

ANSWER: Apparently the Crosley unit you describe is pumping oil which is being trapped in the condenser and evaporator. You have not stated what model of Crosley this is, but I take it for granted it is the open type unit equipped with a capillary tube. A capillary tube type of system will usually pump oil when it becomes low on refrigerant. Actually, it is not a case of pumping oil as we ordinarily think of this term, but rather it is a matter of the oil gradually passing over to the evaporator to replace the refrigerant.

Capillary tube systems have a tendency to maintain a definite liquid level in the evaporator, and if there is not sufficient refrigerant in the system to maintain this level, oil from the compressor will accumulate in such quantities to make up the lack of refrigerant. The fact that you charge refrigerant in the system until you obtain a frost line on the suction line is not always a definite indication of a full charge. It is sometimes necessary to bring that frost line to within a few inches of the compressor, allowing plenty of time for the evaporator to get frosted, and for the refrigerant charge to become properly balanced throughout the system.

### Returning Oil May Frost Line

Returning oil, or excessive agitation in the evaporator may often create a false indication of an overcharged evaporator. I would suggest that you try charging in more refrigerant in an effort to force the oil to return to the compressor and fill the evaporator completely with refrigerant.

During the process of charging, you will probably notice the suction line will frost almost to the compressor, then as you wait for a period of time while the unit is running, the frost line will gradually return. Adding more refrigerant will probably repeat these indications, until all the oil has been returned to the compressor.

You may find it necessary to spend an hour or so in this work adding small amounts of refrigerant each time the frost line returns to the evaporator. When the frost finally stabilizes for a period of time, you will have a definite indication of sufficient refrigerant in the system, and you can purge a small amount of gas until the frost line returns to the normal position.

# Training Program Will Open Soon

## Coordinators Prepare to Organize Local Refrigeration Councils in Communities

A RECENT announcement from W. R. Kromer, director of the National Refrigeration Manpower and Training Program, states that this program, designed to train refrigeration service men, is about ready to be launched. At that time there were 81 coordinators who are prepared to organize local refrigeration councils within their communities. The territory covered by these councils represents approximately thirty-six per cent of the area of the United States, and will represent approximately fifty per cent of the population.

The War Manpower Commission has instructed its field organizations on their part in the program. The U. S. Department of Education and the Department of Training, WMC, will mail complete instructions and course of study to all their offices in the field by January 8.

The Coordinators will be supplied with the complete program statement by January 10. The program will, therefore, be in operation in all of the communities represented by a Coordinator before the last week in January.

The temporary coordinators who have been appointed to date are listed below. Further information will be forwarded as the program progresses.

The list of temporary coordinators is as follows:

C. T. Brasfield, Alabama Power Co., 600 N. 18th St., Birmingham, Alabama.

Parker C. Tucker, Gen'l. Sales Mgr., Arkansas Power & Light Co., Pine Bluff, Arkansas.

J. A. Hill, Pacific Gas & Electric Co., 245 Market St., San Francisco 6, California.

T. M. Fould, Public Service Company of Colorado, Denver, Colorado.

Byron B. Spinney, United Illuminating Co., 1115 Broad Street, Bridgeport, Connecticut.

Alton E. Bisbee, The Hartford Electric Light Co., 266 Pearl Street, Hartford, Connecticut.

H. T. Corcoran, The Conn. Power & Light Co., P.O. Box 2030, Waterbury 91, Connecticut.

R. B. Schroeder, Florida Power Corp., St. Petersburg, Florida.

J. R. Barnhill, Florida Public Service Co., 100 E. Central Ave., Orlando, Florida.

H. K. Brown, Gulf Power Co., Pensacola, Florida.

Wm. F. Edwards, Central Ill. Elec. & Gas Co., 101 Chestnut St., Rockford, Illinois.

J. H. Thomas, Central Ill. Light Co., Peoria.

Frank L. Firestine, Indiana Service Corp., 2101 S. Run Ave., Fort Wayne, Indiana.

O. P. B. Johnson, Indiana & Mich. Elec. Co., 220-222 West Colfax Ave., South Bend, Ind.

Walter Zervas, Electric League of Indianapolis, Indianapolis, Indiana.

Roger Kirk, Peoples' Gas & Electric Co., P.O. Box 481, Mason City, Iowa.

L. G. Johns, Central States Power & Light Corp., West Union, Iowa.

Victor O. Stafford, Sioux City Gas & Electric Co., 515-517 Fifth St., Sioux City, Iowa.

George T. Perrine, Iowa Southern Utilities Co., Centerville, Iowa.

F. M. Guild, Western Light & Tele. Co., Medicine Lodge, Kansas.

F. J. Johannes, The Kansas Power Co., Great Bend, Kansas.

John Jenner, Shelley Electric Co., Wichita, Kansas.

E. N. Avegno, New Orl. Public Service Inc., New Orleans 9, Louisiana.

R. C. Paslay, Louisiana Power & Light Company, 142 Delaronde St., New Orleans, Louisiana.

H. A. James, The Potomac Edison Company, 55 West Washington St., Hagerstown, Maryland.

Ernest W. Allen, Lynn Gas & Electric Co., 90 Exchange St., Lynn, Massachusetts.

G. H. Stocking, Mich. Gas & Electric Co., Godshalf Bldg., Three Rivers, Michigan.

Morris H. Bliven, Alpena Power Co., P.O. Box 312, Alpena, Michigan.

Fred Williams, Manistique Light & Power Co., Manistique, Michigan.

Walter Dougoveto, Wisc. Mich. Power Co., Iron Mountain, Michigan.

C. J. Johnson, Otter Tail Power Co., Fergus Falls, Minnesota.

C. M. Baldwin, Minn. Power & Light Co., Duluth, Minnesota.

D. A. White, Northern States Power Co., Minneapolis, Minnesota.

M. E. Goings, Miss. Edison Co., Box 363, Louisiana, Missouri.

Charles A. Larson, St. Jos. Railway, Light, Heat & Power Co., 520 Francis St., St. Joseph, Mo.

Noel Carrico, Montana-Dakota Utilities Co., Glendive, Montana.

R. T. Bennett, Montana-Dakota Utilities Co., Williston, North Dakota.

Garson A. Reese, Public Service Co. of N. H., Manchester, New Hampshire.

W. W. Scott, N. H. Gas and Electric Co., 46 Congress St., Portsmouth, New Hampshire.

C. R. Butcher, Jersey Central Power & Light Co., 601 Bangs Ave., Asbury Park, New Jersey.

B. L. England, Atlantic City Electric Co., Kentucky & Pacific Aves., Atlantic City, N. J.

John A. Baumgarten, Public Service Elec. & Gas Co., 80 Park Place, Newark 1, New Jersey.

George Kirchner, Millville Elec. Light Co., 209-211 High Street, Millville, New Jersey.

J. E. Flynn, New Mexico Power Co., 201 Don Caspar Ave., Santa Fe, New Mexico.

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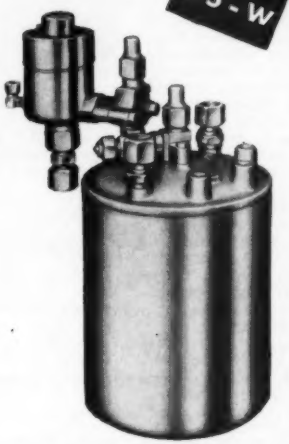

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W. R. Burrill, Staten Island Edison Corp., 50 Bay Street, Staten Island, N. Y.

Herbert Metzger, Rockland Light & Power Co., Nyack, New York.

P. J. Van Keuren, Rockland Light & Power Co., Middletown, New York.

J. C. Richert, Carolina Power & Light Co., Box 1551, Raleigh, North Carolina.

Ray E. Dunlap, Toledo Edison Co., Edison Bldg., Toledo 4, Ohio.

Emory D. Erwin, Central Ohio Light & Power Co., 120 North Main St., Findlay, Ohio.

Merritt A. Giles, The Ohio Public Service Co., Mansfield, Ohio.

Stanley A. Dennis, Columbus & Southern Ohio Elec. Co., 215 N. Front St., Columbus 15, Ohio.

S. Strunk, Electric League of Cleveland, Midland Bldg., Cleveland, Ohio.

Thos. E. Fielder, Okla. Gas & Electric Co., P.O. Box 1498, Oklahoma City 1, Oklahoma.

Charles P. Hudgins, Southwestern Light & Power Co., Chickasha, Oklahoma.

D. J. Frandsen, Public Service Co., P.O. Box 201, Tulsa, Oklahoma.

James L. Brownlee, Luzerne County Gas & Elec. Corp., 247 Wyoming Ave., Kingston, Penn.

G. T. Roberts, Penn. Power Co., 19 East Washington St., New Castle, Pennsylvania.

G. Harold Ritter, Northern Penn. Power Co., 707 Main St., Towanda, Pennsylvania.

J. R. Ramsey, Metropolitan Edison Co., 412 Washington St., Reading, Penn.

G. A. Gardner, Duquesne Light Co., 435 Sixth Ave., Pittsburgh 19, Penn.

W. D. Peters, West Penn Power Co., 14 Wood St., Pittsburgh, Penn.

C. D. Smith, South Carolina Power Co., 141 Meeting St., Charleston, South Carolina.

E. W. Smith, Northwestern Public Service Co., Huron, South Dakota.

R. I. Butterworth, East Tenn. Light & Power Co., 400 State St., Bristol, Tennessee.

H. E. Dorrill, Houston Lighting & Power Co., P.O. Box 1700, Houston 1, Texas.

J. H. Apperson, Texas Power & Light Co., Dallas 1, Texas.

W. A. Huckins, Utah Power & Light Co., Kearns Bldg., Salt Lake City, Utah.

W. O. Cluff, Telluride Power Company, Richfield, Utah.

E. T. Moore, Virginia Public Service Co., Alexandria, Virginia.

J. A. Doyle, Electric Institute of Wash., Pepco Bldg., 10th & E. Sts., N.W., Washington, D. C.

Paul Haymond, Monongahela West Penn Public Service Co., Fairmont, West Virginia.

Clark N. Porter, Wheeling Electric Co., 51 Sixteenth St., Wheeling, W. Va.

Herman E. Kirchner, Appalachian Elec. Power Co., Box 618, Bluefield, West Va.

R. E. Williams, Wisc. Mich. Power Co., Appleton, Wisconsin.

J. D. Howard, Wisc. Power & Light Co., 122 W. Washington Ave., Madison 1, Wisc.

Frank A. Lavelle, Superior Water, Light & Power Co., 1230 Tower Ave., Superior, Wisc.

Edward R. Felber, Madison Gas & Electric Co., Box 1231, Madison 1, Wisc.

A. C. Davey, Wisc. Public Service Corp., Oshkosh, Wisconsin.

F. Parker Allen, Gulf States Utilities Co., Beaumont, Texas.

R. W. Baker, Lafayette Annex, Joplin, Missouri.

## BIRDS EYE-SNIDER DIVISION FORMED BY GENERAL FOODS

THE formation of a new operating unit within the organization of General Foods, to be known as the Birds Eye-Snider Division of General Foods, has been announced by Edwin T. Gibson, vice-president of General Foods Corp., New York.

The new unit is comprised of Frosted Foods Sales Corp., Q-F Wholesalers, Inc., the recently acquired Snider and Ray-Maling Divisions, and B. E. Maling, Inc., a subsidiary. Burt C. Olney, formerly manager of the Snider Division, has been appointed general manager of the new organization.

The new division coordinates the production and research, marketing and accounting, sales and traffic administrations of each of the original companies into a single integrated organization directed by a unified management, and assisted and counseled by Mr. Gibson and the staff of General Foods.

"Among the reasons for bringing these five units together into a single operating group," Mr. Gibson said, "are the opportunities it will give us to serve our customers more effectively. This coordination of our men and equipment will provide many operating advantages and will improve the efficiency of the various units."

Products of the division will include Birds Eye fruits, vegetables, poultry, sea foods, and specialties; condiments and canned fruits, vegetables tomato juice and vegetable juices, and other products under the brands Snider, Lily of the Valley, Burt Olney, Flag, Holiday, Fort, and Mistletow; Snider glass-packed fruits and vegetables; and Ray-Maling canned fruits and vegetables.

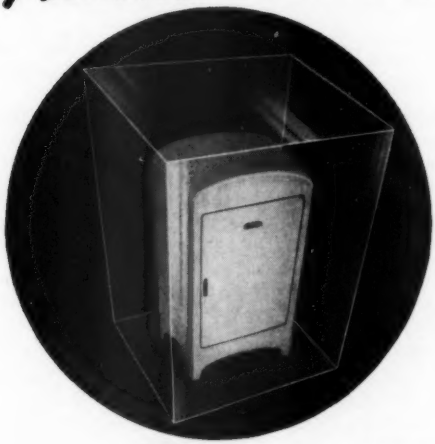
S S S

## FORTUNE MAGAZINE PUBLISHES ARTICLE ON REFRIGERATION

A LENGTHY article on the refrigeration business is published in the December issue of *Fortune*, presenting a very interesting overall survey of its present position and post-war possibilities.

Refrigeration sales and service organizations will be interested especially in its comments on the household refrigerator as well as the home freezer, growing consumption of frozen foods, and less commonly known uses such as shrink fitting for castings. The post-war outlook is pictured optimistically. Air conditioning prospects, it says, for instance, are little less than colossal.

# *Plastic* PACKAGING



# and *Refrigeration*

FROM a partial lifting of a strict blanket of military secrecy have come recent revelations of amazing developments in plastic packaging materials.

Sheer film . . . odorless . . . colorless . . . completely moisture resistant . . . leather tough. . . . proved in military usage to withstand sub-zero temperatures in the Arctics without congealing or cracking.

Such a boon to the frozen foods industry is obvious, and equally obvious is the imminent need for refrigeration units to contain such packaged foods:—

Huge boxes for year-round storage on the farm . . . cabinets for restaurants and institutions . . . chests for tens of thousands of retail stores . . . closures for hundreds of thousands of city homes and apartments.

Chieftain units are adaptable to all such applications and will be available as soon as the urgencies of war lift present limitations, just as Chieftain engineers are now available for consultation on all refrigeration requirements—present or postwar—in the frozen foods industry.

*Chieftain* TECUMSEH PRODUCTS CO.
TECUMSEH • MICHIGAN

# Electric Eye Warns of Gases and Vapors

A VIGILANT "safety patrolman," with an electric eye that can see the ghostly shadows of many otherwise invisible gases and vapors, has been developed by Du Pont scientists to warn of dangerous concentrations of these compounds in the atmosphere of manufacturing plants.

Known as an ultraviolet photometer, the instrument is much faster and simpler than analyzers previously used and it is so sensitive that it can detect one part of carbon disulfide, for example, in a million parts of air. Similarly faint whiffs of other volatile compounds are quickly detected by this electrical watchman.

The problem of contaminated atmospheres is one with which many industries are concerned. Elaborate air conditioning systems, special section hoods, etc., are employed in plants to draw off vapors and gases, and in many situations the workers themselves wear gas masks during certain operations.

It is necessary, however, to make periodic checks of the air in various parts of the plant to ascertain whether the concentration of the volatile substance is being held within the safety level.

## "Quick Samples"

Most analyzers previously employed required 15 minutes or more to take an air sample, which therefore represented only the average concentration of the gas during that period of time. Momentary high peaks escaped observation. The instrument developed by Du Pont, on the other hand, can take quick "grab samples" or run continuous samples and give direct and instantaneous readings.

This permits accurate second-by-second observation of the vapor level in each step of a manufacturing process. For this reason boards of health, insurance companies and industrial engineers have found the analyzer helpful in determining hazards and in arranging equipment and planning air conditioning systems and exhaust flues to render working areas safe.

V. F. Hanson, of the Electrochemicals Department of the Du Pont Company, designed the original instrument and a modified model, intended particularly for carbon disulfide analysis, has been developed by Dr. Shirleigh Silverman, assisted by Dr. J. W. Ballou and W. H. Warhus, all of the Rayon Technical Division of the company. The Mine Safety Appliance Company is planning to manufacture instruments of this general type.

## Based on Light Absorption

Operation of the ultraviolet photometer is based on the phenomenon of light absorption by gases. Most gases, including the constituents of the air itself, absorb light of some particular wave length, in effect casting a shadow where that particular wave length light would otherwise have fallen. In a spectrum that shadow is known as an absorption line.

Carbon disulfide, for example, strongly absorbs light having a wave length of 3132 Angstrom units. (An Angstrom unit is equivalent to 39 ten-billionths of an inch.) Light of this wave length is in the ultraviolet range, invisible to the human eye but not to the electric eye, which in the case of the Du Pont analyzer is a sodium photocell.

The carbon disulfide analyzer is so constructed that the air to be analyzed is pumped through several small chambers, which filter out dust, oil and moisture, and thence into a pair of parallel tubes, about 31 inches long. The contaminated air runs into the first tube and then through a canister of activated charcoal which removes the carbon disulfide, and passes purified air into the second tube. In this way there may be a continuous comparison of the purified with the contaminated air and very minute differences may be detected.

## Light Rays on Photocell

Rays of invisible ultraviolet light from a mercury lamp pass through the two tubes and fall upon a photocell mounted at the opposite end of each tube. The optical system, including filters, has been so selected that about 60 per cent of the photometric response of the electric eye is due to light of 3132 Angstrom units in wave

length, the light which carbon disulfide absorbs. No other atmospheric element has been found in plants where this instrument is used that absorbs either this band of light or the 3650 Angstrom unit band, which accounts for most of the remainder of the photocell's response.

As an example of how the analyzer is used, Dr. Silverman cites a test in which 61 readings were made during the nine minutes required to open, dump and clean out a large vessel in which material was treated with carbon disulfide. During most of the operation the concentration of gas remained below 20 parts per million and older methods of analysis, which could give only the average for this entire time interval, would show no danger points. However, the watchful electric eye revealed that the concentration rose to 60 parts per million at one moment and to 40 at another.

In regard to detecting refrigerant gases no studies with the instrument have been made in this particular field. However, the principle embodied in the instrument could no doubt be adopted for other types of gases. The problem is one of finding a light source which would give radiations in the band in which the gas is absorbed.

* * *

## LOW TEMPERATURE INSTALLATION FOR LABORATORY

THE temperature produced in a small cabinet in an eastern university's laboratory is so low that it requires the same cooling capacity of refrigeration machines that are used in connection with air conditioning for a four-story office building.

The same physical law that is illustrated when a glass of ice water becomes "sweated" in summer is employed in the condensation of a gas that is of great importance in the chemical field.

Two Carrier refrigeration machines supply the low temperature needed for the process, known as fractional condensation. With a total cooling capacity equivalent to the melting of 60 tons of ice a day, the machines lower the gas temperature to minus 80° F. For water to collect on the outside of a glass, the water temperature in the glass needs to be no lower than plus 50° F. on an average summer day. Although the cooling level for condensation in the two cases is far apart, the principle involved is the same. This installation is illustrated in the cover picture of this issue.

## HERMAN GOLDBERG ENTERTAINS TRADE AT CHRISTMAS PARTY

THE annual Herman Goldberg Christmas Party was held at the Drake Hotel, Chicago, Thursday evening, December 16, 1943. More than 850 guests were present from various cities between California and Maine, and Florida to Canada.

Official photographer for the occasion, Irving Alter, took a number of pictures, a few of which are reproduced on the next page. The picture at the bottom shows the finale of the show when Mr. Goldberg stepped to the microphone and invited all those present to attend the 1944 party.

Music was furnished by Don Fernando's nationally known orchestra and in addition the program of entertainment included the six Byton dancers; Ada Lynn in her own specialty; Danny O'Neill, Columbia Broadcasting Systems' singing star; Randy Brown, paddle ball wizard; the Five Taylor Kids, acrobatic wonders. Sid Blake performed quite satisfactorily as master of ceremonies.

Sandwiches, soft drinks and beer were served throughout the party which was officially closed at 2:00 a.m., although various groups continued to enjoy themselves after that time.

## SNAPSHOTS FROM HERMAN GOLDBERG'S ANNUAL CHRISTMAS PARTY

(See Next Page)

(1) Paul Reed, Servel, Inc., Evansville, Ind.; C. E. Harris, Cambridge, Mass.; A. M. Palen, Minneapolis, Minn.; E. A. Plesskott, St. Louis, Mo. (2) Mr. and Mrs. Tom McMahon, Oak Park, Ill.; Bob Dresden and friend, Oak Park, Ill. (3) Don McGill, Peoria, Ill.; John Drisscoll; Mrs. McGill; Art Pailand. (4) Mr. Bridgman, Bush Mfg. Co., Chicago, Ill.; W. Bodinus, Carrier Corp., Chicago; Herman Goldberg; L. C. McKesson. (5) Clarence Roegler, Gustav Larson Co., Milwaukee, Wis.; Mrs. Al Fein; Mr. and Mrs. Al Rider, Mills Novelty Co., Chicago, Ill.; Al Fein, Kerotest Mfg. Co., Chicago, Ill.; Mrs. Irving Alter, Harry Alter Co., Chicago, Ill. (6) Mr. and Mrs. Lou Grauer, Detroit Lubricator Co., Chicago, Ill.; Mr. and Mrs. J. B. McGuan, Automatic Heating & Cooling, Chicago, Ill.; Mr. and Mrs. Don McGill; Mr. and Mrs. Willis Stafford, Detroit Lubricator Co., Chicago, Ill. (7) L. C. McKesson, Ansul Chemical Co., Marinette, Wis.; Mr. and Mrs. Marc Shantz, Tecumseh Products, Chicago, Ill.; Mrs. McKesson; F. R. Pond, Refrigerating & Industrial Supply, Minneapolis, Minn. (8) Mr. and Mrs. Harry Bernhart, Harry Alter Co., Chicago; Pvt. Arnold Bernhart. (9) Mr. and Mrs. Ben Seamon, Westland Eng. Supply, Chicago; Clarence Sieben, Sieben's Brewery, Chicago; Mr. Cole; Miss Utescher, Chicago; Mrs. Cole; Al Stickney, Armour & Co., Chicago, Ill. (10) Mr. and Mrs. Herman Goldberg. Bottom view shows group of musicians, dancers and other entertainers with Herman Goldberg acting as master of ceremonies.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# Refrigeration Service Engineers Society

**Official Announcements of the activities of the International Society and Local Chapters appear in this department as well as articles pertaining to the educational work of the Society.**

**THE OBJECTS OF THE SOCIETY**

To further the education and elevation of its members in the art and science of refrigeration engineering; for the reading and discussion of appropriate papers and lectures; the preparation and distribution among the membership of useful and practical information concerning the design, construction, operation and servicing of refrigerating machinery.

**INTERNATIONAL HEADQUARTERS: 433-435 North Waller Ave., CHICAGO 44, ILL.**

## CENTRAL CONNECTICUT CHAPTER HAS SUCCESSFUL YEAR

THE Central Connecticut Chapter ended 1943 as the most successful year since its beginning. In spite of the many drawbacks due to the man, gas and material shortages, the local chapter with its home office in Hartford, has reached out over a fifty mile area, adding thirteen new members.

Among those whom the members feel proud in having in the chapter is Alfred Compton, chief electricians' mate, New London Sub Base U. S. Navy. Compton, who has as many stripes an an Admiral, is installing and servicing naval vessels. He was due for retirement a few years ago but is still in there pitching for Uncle Sam.

Ending the 1943 season, the Chapter, on October 17, held an outing attended by 55 refrigeration men. A baseball game and field events occupied the day time activities, with a buffet lunch at noon. The evening was started with a chicken and lobster dinner. Refreshments and an educational program was climaxed with some barber shop harmony.

December 11 a social for members and their wives turned out to be a gala affair. Dancing to an orchestra with a showing of movies taken at the outing followed with a buffet lunch and refreshments.

The educational committee did remarkably well in presenting speakers and movies for the meetings during the year in spite of the traveling difficulties.

Looking back, the year 1943 was very profitable for the Chapter and members are looking forward to another good year.

## *R.S.E.S. Chapter Notes*

### DAYTON CHAPTER

*December 9*—The meeting was held in the home of George Click in Springfield. A large attendance was present and the first order of business was the annual election of officers. Those elected were: *President,* J. H. Van Riper; *First Vice-President,* Geo. Click; *Second Vice-President,* R. E. Wagner; *Secretary,* D. R. Goll; *Treasurer,* G. E. Kibler; *Educational Chairman,* Glen Eschelman; *Sergeant-at-Arms,* Chas. Bernholt; *Board of Directors,* G. H. Brock, Chairman; Ray Brown and H. R. Shoupp. Installation of officers will take place at the meeting of January 18. Discussion of further business took up considerable time in the evening—then the meeting was adjourned for a social evening provided by Mr. Click. The thanks of the Chapter for his hospitability and a very enjoyable evening were voted Mr. Click.

### ATLANTA CHAPTER

*December 6*—The regular meeting was held at the Imperial Hotel with the President, Thos. Carnell, presiding. The first speaker of the evening was Bill Kite, who told of his experience of changing a Freon job to methyl and having to spend 10 days in the hospital as a result of having breathed the fumes. The next speaker was Ted Elder, with the Georgia Power Co., who told of an unexplained fire while working with methyl chloride—then Bill Adams, also of the Power Co., told of having a Kelvinator drink box blow up with him while he was testing it for leaks.

The main speaker of the evening, Mr. L. C. McKesson of Ansul Chemical Co., explained the results of mixing gas with other refrigerants, such as sulphur dioxide and Freon. This was a very interesting and educational talk, with members asking questions and answers given by Mr. McKesson. Every one of the 51 members and friends present enjoyed and were benefited by this talk.

A delicious turkey dinner was served, following the program, and during the dinner a box of candy was sold to the highest bidder, which netted the Chapter treasure $10.00. After the splendid talk by Mr. McKesson, six members were added to the roll and the meeting was adjourned until the first week in January, 1944.

## MOTOR CITY CHAPTER

The Chapter held a special meeting in Saginaw, Michigan, recently for the purpose of extending its territory and activities. There was a large turn-out and 13 new members joined the Chapter. President, Fortune, presided over the meeting and the Secretary provided the visitors with a resume of the history, purposes and objects of the Society and benefits to be gained through membership. He was aided with further comments from Messrs. Hanson and Clark.

The interest was such that the new Saginaw members immediately began consideration of forming a new Chapter in that area. This consideration is partly due to gasoline rationing and to the desire of the members to hold meetings in their own city—consequently, officers were elected to carry on temporarily, who are: *President,* Vernon Dingman; *Vice-President,* Arthur Kimmell; *Secretary,* C. H. Earl and *Treasurer,* Charles Dent.

In the meantime, all new members were invited to the next regular meeting of the Motor City Chapter to be held in Flint, January 11. Thanks went to Mr. J. Geo. Fischer of Saginaw for the luncheon and meeting space which he furnished.

## MOUNT ROYAL CHAPTER

*November 18*—Approximately 60 members attended this meeting with J. M. Turner, Vice-President in charge. Three new applications were received for membership and accepted. The first two were Mr. Amyot and Mr. A. Haig, applying for active membership, and the second from Mr. Trudeau of Laval Products Co. applying for junior membership. Since the next meeting is designated as the annual election of officers, a nominating committee consisting of Messrs. Tremblay, Whimhurst, Brodeur, Greenberg and Lemay was appointed to select a slate of officers for the coming year.

Several guest speakers were present for the evening, the first of whom was Mr. Roper from the Halifax Insurance Co., who gave the meeting considerable information on insurance problems. Several members of the Interprovincial Chapter were also present and spoke a few words of greetings to the audience. The new branch manager of Frigidaire, Mr. J. A. McColl, was introduced as a guest of the evening.

## LOS ANGELES CHAPTER

*November 17*—As usual, the meeting started with a dinner and after the boys were comfortably full and ready to tackle the business of the evening, President W. C. Irving called the meeting to order. Bill Commerford and Art Dawson were appointed salesmen for the defense stamp tickets, later to be drawn as door prizes. A total of $20.00 worth were sold. New applications for membership received during the evening were from: Ralph E. Longbine, Harry A. Gillmore, Ellis L. Bickerstaff, Frederick A. Tremble, Floyd McCullah, Welbert T. Barron, Bennett H. Curtis, Eugene E. Caskey, Herbert H. Turner and John A. Saxon.

W. W. Allison spoke at length on the new city of Los Angeles code. He brought out the high points of the new code, explaining the advantages of each. Mr. Allison has done a good deal of work on the formation of this code, and a vote of confidence was given him by the Chapter. A nominating committee was appointed during the evening to draw up a slate of new officers for the coming year. The election would take place at the next meeting. Entertainment for the evening took the form of two motion pictures, the first of which was "Canada on Birds" and the second "The Jap Zero."

## YOUNGSTOWN CHAPTER

*December 22*—The meeting was held at Saxon Hall and was presided over by President Deiter. The first order of business was the annual election of officers and on the vote of the members, a nominating committee was dispensed with and nominations were made from the floor. The final results of the election were as follows: *President,* Ed Wright; *Vice-President,* Perry Grocott;

*Secretary and Treasurer,* Chas. Campbell; *Sergeant-at-Arms,* Dawson.

The new officers were inducted into office at once and as soon as Mr. Wright took over the chair, he outlined some of the plans he had in mind for the coming year's activities. He also spoke on some of the newly developed applications of refrigeration in the low temperature field. The next order of business was the appointment of committees to serve during the year, which are as follows: Educational Committee—Delmar Swenehart, Chairman; E. H. Grocott, Dallas Nutt and Mills Rumaley; Program Committee—Oscar Tolerton, Chairman, Pat Grocott, Carl Dieter, Glen Thayer, and R. M. Mathias; Regulations Interpretations Committee—Martin Bokosch, Chairman, Roy Keith, Dallas Nutt and Glen Thayer.

Plans for a meeting to be held January 14 were announced at which time an impressive program is planned. On the program will be George F. Taubeneck, Warren W. Farr of Cleveland, Lief Oyen and John Clark of War Production Board, Mr. Kennedy Hanson, Executive Secretary of R.E.M.A. and W. R. Kromer of Cleveland, regional director of the War Manpower Commission. As planned, this will be an open meeting and members are urged to bring a friend. Mr. Glen Thayer of Ohio Edison Co. gave an interesting talk on a new plan of cooperation between the Ohio Edison Co. and members of the Youngstown Chapter.

Carl Vogel spoke on the methods employed in changing refrigerating units from Freon to methyl chloride, giving ample warning of the dangers involved. He stressed the point that aluminum magnesium and synthetic rubber used in Freon units could not be used with methyl.

### ILLINOIS VALLEY CHAPTER

*December 10*—The annual election of officers was the chief business at this meeting and the following officers were elected: *President,* John Sackey; *Vice-President,* Henry Loercher; *Secretary,* Wayne Eakles; *Treasurer,* Clyde Tobias; *Sergeant-at-Arms,* Earl Dorman; *Educational Chairman,* Bryson Roth; *State Director,* Frank Wolcott; *Board of Directors,* Harry Hauser, Glen Dresback and A. D. McGill. Present plans called for these officers to be installed at the January 14 meeting.

## CORN BELT CHAPTER

*November 17*—During the course of the business session meeting, a motion was made and passed that the graduating class of Commercial Trades Institute be invited to

**MEMBERS OF CORN BELT CHAPTER MEET TO DRAFT CONSTITUTION AND BY-LAWS.** Front row: H. V. Oakwood, Treas.; R. E. Saunders, Secy.; Joe Woodard, Vice-Pres.; John Hamilton, Pres. Second row: R. L. Hendrickson, Chairman Educational Comm.; D. D. Orr, Director; A. C. Hollatz, Director; C. M. Trigg, Director.

the first meeting in January at which time the General Electric Co. will present a film on servicing General Electric equipment. R. L. Hendrickson was appointed Chairman of the educational and examining board, and upon accepting the office, Mr. Hendrickson gave a short talk, in which he outlined some of the duties he expected to perform and the cooperation he desires from the members. President John Hamilton appointed Albert Bailey chairman of the membership committee, and on the publicity committee he appointed Carl Marcus. Mr. Hendrickson suggested that a reporter from the Daily Pantagraph be invited to the meeting for the purpose of publicity.

## MISSOURI VALLEY CHAPTER

*October 7*—The meeting was called to order by President Hart. One of the first discussions on the program was that on subjects to be used in forthcoming educational programs during the winter season. A committee was appointed by the President to compile a program.

On November 28, a committee meeting was held at which time the question of obtaining a speaker from Wagner Electric Co. and the arrangement of a meeting to be devoted entirely to chemicals, and also the question of securing a speaker from the Jobbers Asso-

ciation were taken up. It was also suggested at this time that the subject of locker plants be taken up at a forthcoming meeting. The committee decided that a stag party some time in January and a joint party in March or April would be desirable. A program committee was appointed consisting of Messrs. Enders, Ruegg and Mahan with Mr. Enders as Chairman.

*November 23*—A dinner party was held at the Hotel Wellington by the Chapter on this date. After the dinner, the greater part of the evening was spent in playing bingo in which prizes were awarded. The balance of the evening was spent in dancing and a good time was enjoyed by all.

### TWIN CITIES CHAPTER

*December 7*—Among the discussions that arose under the heading of new business was one on the desirability of holding a certificate membership examination in the near future. The final outcome was that the President was asked to appoint an educational committee to lay out a program leading up to the final examination of such members as wish to participate for certificate membership.

The apprentice training program is getting under way in Twin Cities and Art Palen gave a report of the results. Art Palen, Joe Parupsky, Jack Ehlers, True Ingersoll, Dick Taylor, George Klahn, Bill Warner and Vince Richardson met with Mr. D. A. White of the Northern States Power Co. and Mr. Bovean, regional director of the apprentice training program for the area, laying the plans for the program to be started in the near future. Considerable progress has been made to date and other meetings are scheduled for the near future.

The next order of business was the annual election of officers which after following the usual routine, resulted in the following being elected: *President,* C. A. MacCafferty; *First Vice-President,* G. V. Randall; *Second Vice-President,* J. C. Ehlers; *Secretary,* Dean Holmes; *Treasurer,* D. E. Frank; *Sergeant-at-Arms,* I. L. Baldwin; *Board of Directors,* Art Palen, George Lewis and Joe Parupsky.

*January 4*—The meeting was turned over to the newly elected officers; therefore, the new President, C. A. MacCafferty, presided. Mr. MacCafferty outlined his plans for the coming year and his plans for conducting future meetings. Art Palen reported on his

attendance of the International Board of Directors meeting in Chicago at which time he cleared up several Chapter matters as they related to the national office.

A general discussion on the draft status of the members arose resulting in a motion being passed that the Secretary write all members in regard to their draft standing and to those who are in danger of being drafted, to offer the Chapter's assistance in obtaining deferments, being understood, however, that any action taken will be left to the discretion of the Board of Directors. Lester Ost gave a report on new government regulations relating to service rates to customers and employee over time pay.

### ONTARIO MAPLE LEAF CHAPTER

*November 19*—Shortly after opening the meeting, it was turned over to the Chairman of the educational committee, who in turn introduced the speaker of the evening, Harry Anderson of the Wagner Electric Co. Mr. Anderson gave a very interesting talk on motors and their design changes in the past 25 years. Mr. Weaver followed with some information on the feasibility of sealed units in ice cream cabinets. The final wind-up of this educational program was a discussion on motor problems. Five new applications for membership were accepted from: T. A. Tran, Active; R. Livingstone, Active; H. V. Bray, Active; H. Allen, Associate and C. Raccioppa, Active.

*December 10*—On the educational program for the evening, W. J. Marshall, Chairman of the educational committee, introduced W. Kennedy of the Frigidaire Corp. Mr. Kennedy gave a very interesting talk on the probable position of a service engineer in the post-war world.

### MILE HIGH CHAPTER

*December 13*—The meeting was called to order by Ernie Martin, who presided in the absence of the president and vice-president. At the November meeting, several of the members donated parts of a refrigerator to be used in cooling refreshments for the meeting. Ernie Martin had assembled these parts which resulted in a very nice refrigerator doing its job during this meeting of cooling refreshments on hand.

The subject of a refrigeration code for Denver was discussed and it was decided to give the matter more study. Plans for a meeting to be held in January were started and an elaborate program outlined. This meeting is to be a social and business meeting with wives and friends attending.

### TRI COUNTY CHAPTER

*December 18*—W. C. Metcalf, State Board Director, reported to the meeting the results of a State Board of Director's meeting held December 16. Mr. Metcalf outlined a proposed expansion of the Illinois Association in which the name would be changed to Illinois Midwest Association. The plan is to widen the territory of the association to take in surrounding states.

On the educational program, Mr. Anderson gave an interesting talk on Freon to methyl changeover, outlining the essential differences between the two refrigerants. A very interesting discussion followed.

### PROVIDENCE CHAPTER

*December 8*—The Entertainment Committee advised that they had received an invitation from Stuart Garland to visit one of the new locker plants that had just been placed in operation, and it was decided to authorize the Entertainment Committee to make the necessary arrangements to visit this locker plant on their next regular meeting night.

The greater part of the balance of the evening was spent in a discussion of the working difficulties of the members. Some of these difficulties are created by the city ordinance now in effect and by the allocation of work among the different trades. There also seems to be a wide difference in labor charges for service work which it is felt should be stabilized.

### SPRINGFIELD CHAPTER

*December 18*—The meeting was held in the home of Mr. and Mrs. J. J. Kline and was preceded by a dinner, followed by a grab bag at which everyone seemed to have fun. The nominating committee presented its report which resulted in election of the following: *President,* A. L. Fait; *First Vice-President,* Frank Abraham; *Second Vice-President,* Lawrence Mathies; *Treasurer,* John Stoppelwerth; *Secretary,* Kenneth Beatty; *Sergeant-at-Arms,* John Pokora.

### INTERPROVINCIAL ASSOCIATION

The officers of the Interprovincial Association held a business meeting on November 28 at which time several important matters were taken up. One of the first items of business was arrangements for the presentation of the Charter to take place at the annual meeting in March. Correspondence relating to these arrangements was read and plans completed.

### SAN DIEGO CHAPTER

*December 9*—This was a dinner meeting held at the San Diego Club. Twenty-two members enjoyed the dinner, as did five guests. The annual election of officers took place at this time with the following results: *President,* H. E. Friedricks; *Vice-President,* N. E. McDougal; *Secretary-Treasurer,* M. R. Hanks; *Sergeant-at-Arms,* Merle Wampler.

The Chairman of the educational committee, Mr. Davis, initiated a rather unique Question Box. Numbered cards were passed out with a request that each person write on it a simple question. These were picked up, shuffled and again handed out. The recipient was required to answer the question he drew or call for someone else to. A lot of information and fun resulted from the idea.

### WYOMING VALLEY CHAPTER

*December 13*—Following the preliminary business matters, the annual election of officers took place with the following results: *President,* Louis Harris; *Vice-President,* Pat. Maneval; *Secretary,* John J. Selera; *Treasurer,* Walter Wells. Retiring President, Jack Cusick, congratulated the new officers, wishing them success and then announced he is leaving for Panama where he will accept a position with the government. On December 27, a farewell party was held for Jack, who left on December 29.

## *Ladies Auxiliary*

### ROCKFORD AUXILIARY

At the November meeting of the auxiliary, a drawing took place for the purpose of exchanging Christmas gifts. Discussions following were related to a matter that would benefit the auxiliary during the coming year. President, Mrs. Dorothy Shipman, was presented with a box of candy from the Illinois Association in appreciation of the auxiliary's assistance in entertaining the ladies at the convention held in Rockford.

On December 6, instead of having a regular business meeting, the ladies went out for dinner and exchanged their gifts.

### NIAGARA FRONTIER AUXILIARY

*November 12*—The meeting was held in the home of Mrs. John K. Bush at Lockport, N. Y. Plans for a Christmas party were discussed and it was decided that no regular meeting would be held during December. A drawing was held later on in the evening in which Mrs. Goeckel was the winner.

### TWIN CITIES AUXILIARY

Mmes. Ost and Berheim were appointed to draw up a constitution and by-laws for the auxiliary and to be presented for discussion at a later date. It was suggested that the January meeting be combined with a luncheon and Mmes. Hanson and Coulter were placed on a committee to make arrangements and buy prizes. The January meeting will be entirely social. Later on in the evening, members of the R.S.E.S. Chapter joined the ladies just in time to see Santa Claus appear and to participate in the exchanging of gifts and the games that were played afterward. Refreshments were served.

S S S

## MIDWEST JOBBERS MEET

A MEETING of the Midwest Refrigeration Supply Jobbers Association will be held Saturday, January 22, at the Fontonelle Hotel, Omaha, Nebraska. The meeting will start at 12:00 o'clock, noon. All members of the Association, as well as all factory sales representatives or others interested in such a meeting, are cordially invited to attend. J. F. Wickham of the Wickham Supply Co., Lincoln, Nebraska, is secretary-treasurer.

## YORK OPENS NEW PHILADELPHIA OFFICE

NEW headquarters for the Philadelphia branch of the York Corp., refrigeration and air conditioning manufacturers, have been announced by M. S. LeBair, manager of the local branch. The new location is at 1616 Walnut St.

The York Philadelphia headquarters, established since 1908, were formerly at 1288 North 44th St. The new offices will be used for all engineering, sales, maintenance and service work while the 44th St. building will house the company's regional construction and accounting departments covering work in Boston, Atlanta, New York, Cleveland and Philadelphia, according to Mr. LeBair.

Formal opening of the new headquarters was celebrated with a dinner at the University Club attended by W. S. Shipley, chairman of the Board of the Corporation, local distributors and employees.

S S S

During March the American Red Cross will raise its 1944 War Fund. A goal of $200,000,000 has been set. This must be met if the Red Cross is to continue its work on an undiminished scale. Let's give!

## DAWSON NEW ALCO VICE-PRES.

RICHARD S. DAWSON, general sales manager of the Alco Valve Co., St. Louis, for the last four years, has been elected vice-president in charge of sales, it has been announced by Arthur B. Schellenberg, Alco president.

RICHARD S. DAWSON

Mr. Dawson studied engineering at Syracuse University and the Massachusetts Institute of Technology, later becoming a telephone engineer for the Bell System and taking that company's engineering course. In 1926 he joined the American Radiator Co., serving as field engineer and with the general sales office in New York, later being transferred to the Detroit Lubricator Division as the Philadelphia representative. He moved in 1935 to the Fulton Sylphon Co. as manager of the refrigeration division.

Joining Alco in 1938 as assistant New York manager, he was called to the home office in St. Louis the following year to take up the duties of general sales manager.

Mr. Dawson has done considerable educational work with trade and technical groups, has written a number of technical trade journal articles, edited the Alco "Handbook of Automatic Refrigerant Control," and has served on various A.S.R.E. and R.E.M.A. committees.

## YORK STARTS NEW STUDIES

BASIC problems which face refrigeration design engineers are now being studied at the York Corporation laboratories for fundamental research at York, Pa., as part of the company's plans for the development of new products and improvement of existing equipment, according to William E. Zieber, Director of Research. Among the projects are one to discover better methods of food preservation and more efficient refrigeration components than are now available in the industry.

At special ceremonies attended by more than 5,000 war workers and their families, the Army-Navy "E" for outstanding achievement in production of air conditioning and refrigeration for war was awarded the company.

Brigadier General H. F. Safford, Chief of the Production Service Branch of the Army Ordnance Department presented the award.

## KEROTEST MOVES N. Y. OFFICE

THE Kerotest Manufacturing Co. has removed its New York City office to Room 3206 Lincoln Building, 60 East 42nd Street. The telephone numbers are MUrrayhill 2-4816-7, and the postal district New York City 17. The Kerotest home offices and plants are located at Pittsburgh, Pa.

## HENRICH JOINS AUTO-DIESEL PISTON RING CO.

ANNOUNCEMENT is made that August H. Henrich is now associated with the Auto-Diesel Piston Ring Co. of 3145 Superior Avenue, Cleveland, Ohio. He is assistant to the vice-president and the general manager. Mr. Henrich was formerly in the experimental department of the Thompson Products, Inc., Cleveland, Ohio. He has been associated with the Cleveland Tractor Company and the Pipe Machinary Company in experimental work and was superintendent of the Enterprise Tool Company. Mr. Henrich also operated his own tool manufacturing and jobbing business and is a member of the American Society Tool Engineers and the Cleveland Engineering Society.

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## McNEELY TO DIRECT ANSUL CHEMICAL ADVERTISING

THE appointment of R. C. (Bob) McNeely has been announced by H. V. Higley, president of Ansul Chemical Company, Marinette, Wisc., to direct that company's advertising, effective November 1. Mr. McNeely has a background in the advertising field extending over a period of 22 years. His last connection was with Signal Electric Manufacturing Company, Menominee, Michigan, as sales and advertising manager, which post he held for 12 years. Prior to that he was assistant advertising manager for The Lloyd Manufacturing Company of the same city. He will handle the advertising duties for both Ansul and its subsidiary, duGas Engineering Corporation.

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## CROSLEY SELLS CHICAGO BRANCH

THE Crosley factory branch at 1512 South Michigan Ave., Chicago, has been sold to the Harry Alter Co. of Chicago. This is in line with the Crosley policy to handle its post-war distribution largely through independent distributors. The Alter company will take over both the personal and physical properties of the Crosley Chicago branch and operate it as a part of its merchandising and distributing business in the Middle West. The Harry Alter Co. is headed by Harry Alter who has been merchandising electrical and radio appliances since 1920.

## WEATHERHEAD ANNOUNCES TWO NEW VICE PRESIDENTS

TWO new vice-presidential posts at the Weatherhead Company have been announced by A. J. Weatherhead, Jr., president of the Cleveland, Ohio, firm. The newly created position of executive vice president will be filled by H. I. Lewis, Hartford, Conn., an official of the American Hardware Company. Henry F. Bailey, Cleveland banker, will take over the position of vice president in charge of finance.

H. I. LEWIS

Mr. Lewis brings to his new duties a wide manufacturing and executive experience as vice president, director and a member of the executive committee of American Hardware, and as general manager of the Corbin Screw Products Company, a subsidiary. A graduate of Massachusetts Institute of Technology with a degree in mechanical engineering, he was formerly associated with the Seybold Division of Harris-Seybold-Potter, and with American Type Founders.

Mr. Bailey has been with the National City Bank of Cleveland for seven years as loan officer and vice president, and is already a director of the Weatherhead Company. He was formerly associated with the Federal Reserve Bank and with Lockwood Greene Engineers, management and consulting firm. A registered professional engineer, he graduated from the University of Vermont in 1915 with a degree in civil engineering.

## NEW GENERAL ELECTRIC SET-UP

THE Metropolitan distributing branch of the Appliance and Merchandise Department, General Electric Co., according to announcement to dealers in the New York wholesale area by Hardage L. Andrews, vice president in charge of the A & M Department with headquarters in Bridgeport, Conn., will be responsible for the sale and distribution of the following appliances:

General Electric refrigerators, ranges, home laundry equipment, water heaters, dishwashers, and kitchen cabinets.

The Distributing Branch assumed its duties, effective January 1, 1944, and will serve the New York metropolitan area, exclusive of New Jersey. The Branch headquarters will be located in the General Electric Building, 570 Lexington Avenue, under the management of Earle Poorman.

## FEDDERS STARTS ON NEW ORDER

THE Fedders Manufacturing Company of Buffalo, N. Y., has been increasing production of water coolers for the armed services and industry and beginning in 1944 will close its ordnance division and start production of heat exchangers for military aircraft, General Manager Edmund R. Walker has announced.

## DAYTON RUBBER APPOINTS NEW EXECUTIVES

THE appointment of T. C. Davis, formerly manager of industrial sales, as vice-president in charge of mechanical sales planning and experimental sales is announced by the Dayton Rubber Manufacturing Co. T. D. Slingman, New York district manager, has been made vice-president in charge of mechanical sales.

T. D. SLINGMAN

T. C. DAVIS

In the manufacturing and development divisions of the company, H. S. Mooradian, superintendent, has been appointed vice-president in charge of production and Joseph Rockoff, chief chemist, has been made vice-president in charge of development. I. Eisbrouch will continue in the present capacity as vice-president in charge of tire sales.

These offices have been created by Dayton Rubber to serve expanding markets and new product development and increased manufacturing facilities at Dayton, Ohio and Waynesville, N. C. The company is also interested in the operation of the Copolymer Corporation, a synthetic rubber production plant at Baton Rouge, Louisiana.

## BRISTOL CO. ISSUES DATA SHEET

A DATA sheet on recording thermometers for use in frozen food locker plants has been issued by the Bristol Company, manufacturers of industrial recording and controlling instruments. Installation, specifications, and use are clearly described and illustrated. Copies may be obtained by writing The Bristol Company, Waterbury 91, Conn.

Charles B. Cole has opened an electric sales repair and appliance shop at 4642½ Troost Ave., Kansas City, Mo.

## R.S.E. BINDERS

**OUR supply of binders for THE REFRIGERATION SERVICE ENGINEER having become exhausted, we find in trying to reorder that the manufacture of these binders has been barred for the duration, owing to the critical material shortage. We regret that until victory comes, orders from our subscribers for these binders cannot be filled.**

**THE REFRIGERATION SERVICE ENGINEER**

## *Classified Ads*

**Rate: Two Dollars for fifty words or less. 30 cents for each additional ten words or less.**

HELP WANTED—Experienced commercial refrigeration and air conditioning service engineer for a well established Texas concern. Permanent position. State age, experience, and salary expected. Address Box DC-1, REFRIGERATION SERVICE ENGINEER, 435 N. Waller Ave., Chicago 44, Illinois.

WANTED TO BUY—Refrigeration equipment, new or used condensing units, ⅓ to 2 h.p. needed (without priorities). Commercial Refrigeration Maintenance Agency, Louie Jorgensen. Phones: Main 4334 and Talbot 3542, 4121 39th Street, San Diego 5, California.

FOR SALE—100 Frigidaire Model "K" ⅓ h.p. units $32.50. 100 Frigidaire Model "A" 233 E ⅓ h.p. units $42.50. All units in running condition, with A.C. 60 cycle motors. F.O.B. New York. Write for our surplus list. 25% deposit must accompany all orders. Edison Cooling Corp., Dept. "E", 310 E. 149th St., New York 51, N. Y.

POSITION AVAILABLE—Commercial refrigeration service man. Old established concern. Ammonia and low pressure. Experienced only. Year-round employment. Best conditions. Union scale. Chicago. Address Box JA-4, REFRIGERATION SERVICE ENGINEER, 435 N. Waller Ave., Chicago 44, Illinois.

POSITION WANTED—Young man 25 years old, technical high school graduate, sales course graduate, will graduate from refrigeration school few weeks, wants position with growing refrigeration firm as junior sales engineer, or in connection with sales or sales management. 6 years sales experience. Single, physically fit, draft exempt. Will travel. Address Box JA-5, REFRIGERATION SERVICE ENGINEER, 435 N. Waller Ave., Chicago 44, Illinois.

# Index to Advertisers

# SERVICE MEN WHO KNOW VALUES SAY

## "DAVISON'S SILICA GEL

**tops all drying agents because it gives the extra protection we need these days . . . protection against corrosion resulting from acids!"**

They're right! Because it was developed especially for the refrigeration industry, Davison's Silica Gel has proved its ability to do more than just eliminate troubles caused by moisture.

Now that the substitution of methyl chloride for "Freon" faces you . . . increasing the corrosion hazard . . . you must play safe. Use the drying agent that removes acids as well as moisture . . . Davison's Silica Gel!

Your jobber stocks it . . . in factory-charged dehydrators and for refilling.


• IN ADDITION TO MAXIMUM CAPACITY FOR MOISTURE AND REMOVAL OF ACIDS AND CORROSIVE COMPOUNDS . . .

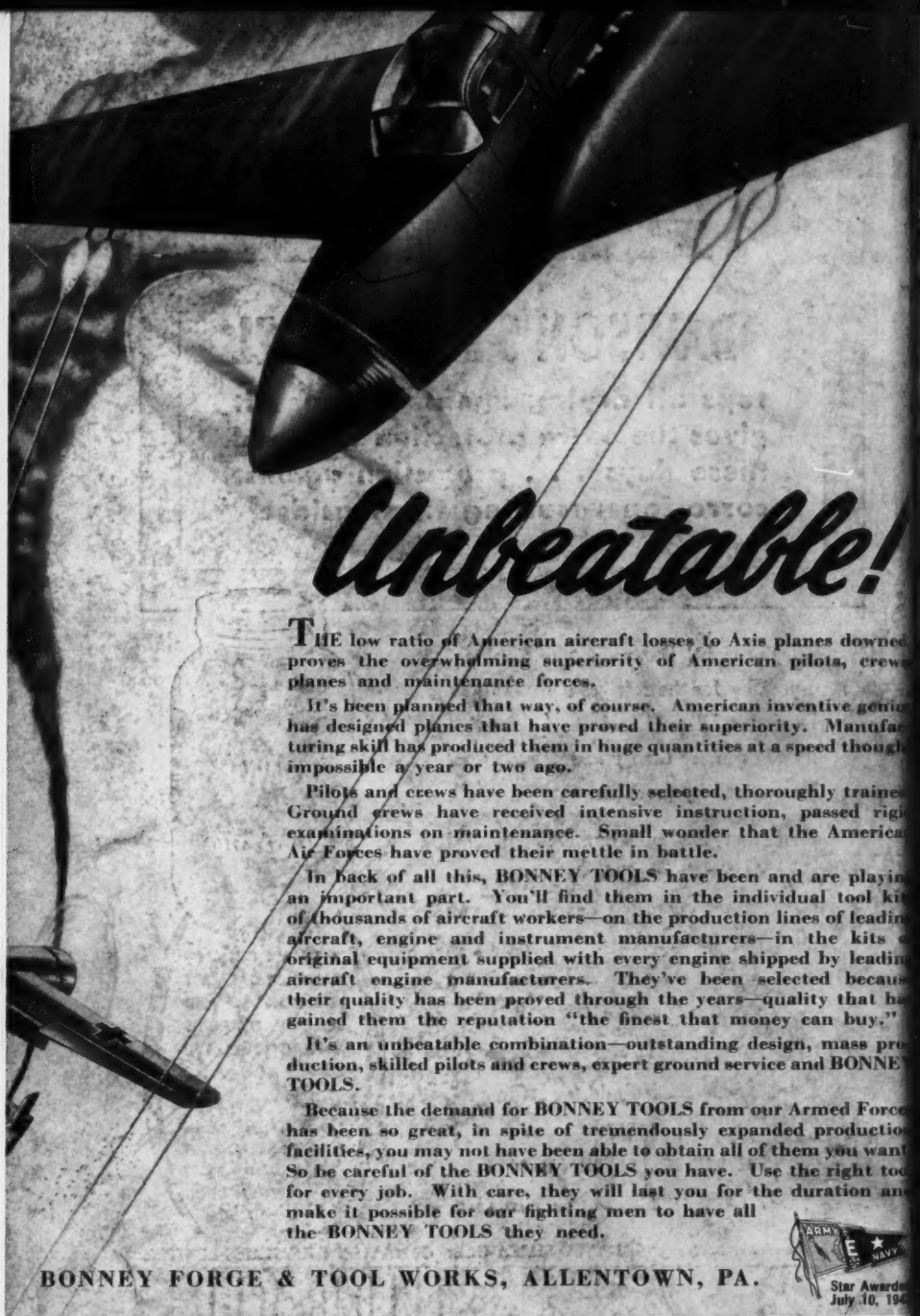
*Davison's gives you*

Instantaneous Action
Freedom from Dusting and Powdering
and is
Chemically Inert

THE DAVISON CHEMICAL CORPORATION
*Progress through Chemistry*
BALTIMORE-3, MD.

*Canadian exclusive sales agent for* DAVCO SILICA GEL: CANADIAN INDUSTRIES LIMITED

*Accelerated* SILICA GEL



# Unbeatable!

THE low ratio of American aircraft losses to Axis planes downed proves the overwhelming superiority of American pilots, crews planes and maintenance forces.

It's been planned that way, of course. American inventive genius has designed planes that have proved their superiority. Manufacturing skill has produced them in huge quantities at a speed thought impossible a year or two ago.

Pilots and crews have been carefully selected, thoroughly trained. Ground crews have received intensive instruction, passed rigid examinations on maintenance. Small wonder that the American Air Forces have proved their mettle in battle.

In back of all this, BONNEY TOOLS have been and are playing an important part. You'll find them in the individual tool kits of thousands of aircraft workers—on the production lines of leading aircraft, engine and instrument manufacturers—in the kits of original equipment supplied with every engine shipped by leading aircraft engine manufacturers. They've been selected because their quality has been proved through the years—quality that has gained them the reputation "the finest that money can buy."

It's an unbeatable combination—outstanding design, mass production, skilled pilots and crews, expert ground service and BONNEY TOOLS.

Because the demand for BONNEY TOOLS from our Armed Forces has been so great, in spite of tremendously expanded production facilities, you may not have been able to obtain all of them you want. So be careful of the BONNEY TOOLS you have. Use the right tool for every job. With care, they will last you for the duration and make it possible for our fighting men to have all the BONNEY TOOLS they need.

ARMY E NAVY

Star Awarded July 10, 194

BONNEY FORGE & TOOL WORKS, ALLENTOWN, PA.